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VETERINARY MEDICINE

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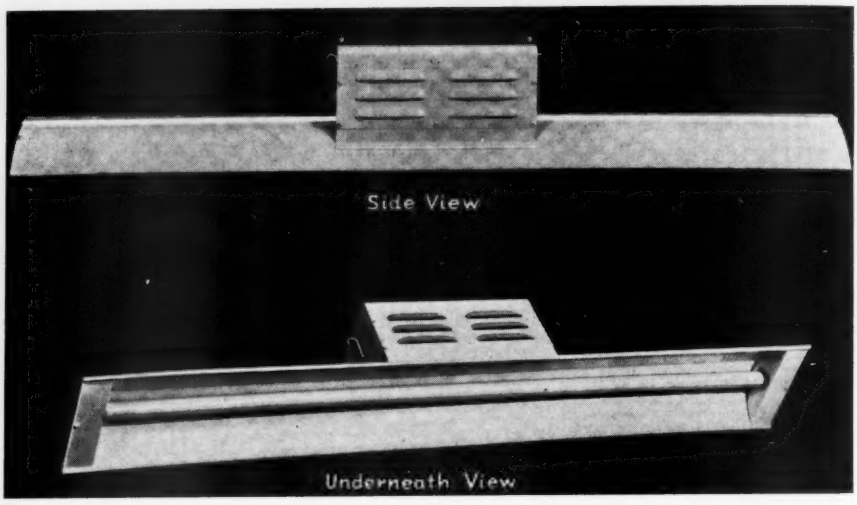

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Booher finds that hunger is associated with weakness, irritability, diminished ability to concentrate and disinclination for sustained work.

* * * *

According to Frostig and Spies, nutritional deficiencies widespread in a population may not only weaken the strength, but may also break down the morale. Sub-clinical pellagra and beri-beri may be an important factor in the fighting morale of an army, supporting Napoleon's contention that "an army marches on its stomach."

* * * *

The administration of heart disease remedies such as digitalin and strophanthin prolongs the life of animals lacking adrenal glands, according to studies made by Drs. R. L. Zwemer and B. E. Lowenstein, of the College of Physicians and Surgeons, Columbia University. Their conclusion is that the hormone of the adrenal gland complex may be a glycoside. A synthetic chemical (desoxycorticosterone acetate) has been produced in Switzerland which has helped patients suffering from Addison's disease (caused by an insufficiency of the hormone produced by the adrenal gland complex) and it is believed by some that this chemical is the same as the gland hormone.

To the 32 recognized types of pneumococci has been added Type 33, isolated by Dr. Jesse G. M. Bullowa of New York City. It is said to be responsible for more cases of pneumonia than many of the previously-established types. Serum for diagnosis and treatment of this type of pneumonia has been prepared by Lederle Laboratories.

* * * *

Men and women who have, or think they have, syphilis and gonorrhea, are today being exploited to the tune of tens of millions of dollars annually, the U. S. Public Health Service charges on the basis of a new survey of drug store "back counter prescribing" and other aspects of venereal disease quackery. Personal interviews by trained investigators posing as "friends" of presumably infected persons were carried on in 1,151 drug stores in 35 cities in 26 states. Sixty-two per cent of the drug stores visited diagnosed the disease and offered to sell remedies for alleged syphilis or gonorrhea, especially the latter. Thirty-one per cent did not attempt to diagnose, but stocked and were willing to sell bottled remedies, especially when asked for them by name. About half of those who sold remedies urged the inquirer to see a doctor. Only 7% of the entire number refused to diagnose or sell remedies.—*Sci. News Letter.*

Compulsory Health Insurance

There is a great deal to be said for the principle of compulsion. When we have compulsory vaccination we eliminate smallpox; when we stop compulsory vaccination, we are apt to have outbreaks of the disease again. We have compulsory education and have practically eliminated illiteracy. So there is some advantage in compulsion, and some form of compulsory health insurance may afford a solution of the problem of adequate medical service for all the people.

If health insurance does not solve the problem of providing medical care in this country, then some other method must be found. There is only one other plan available, and that is the system of public medicine. Public medicine, in fact, is already here. It is a matter of extending the present practices, agencies and institutions to make the system of public medicine more complete to provide medical care for all the people. It is not foreign, or alien, or a system "brought over from England or Germany." It is in operation now in the United States, in every town, every city, every state and in the federal government. We have many public medical services and know exactly how they work.

Those who advocate health insurance claim that it avoids taxation; but taxation is employed merely in a different way by contributions or deductions from wages or payrolls; this is as much a tax as other "government-enforced" payments. We must make up our minds whether we want to have medical service for all, and if we do we must pay the bill, because a bill there must be, no matter how we propose to render the service.

Many of us do not realize how far we have already gone along this road. The last report of Commissioner Goldwater of the Department of Hospitals shows that over half the medical service rendered in the City of New York through hospitals and ambulances was by municipal and county, *i.e.*, government owned and operated institutions. Two-thirds of the beds in all the hospitals in the United States are government owned and operated beds. — *Joseph Slavit, M.D.*, in *Med. Times.*

The monotonous undiversified diets the world over are those most frequently associated with nutritional deficiency diseases. The medical profession should be on its guard against the long continued use of such diets in the treatment of special diseases.—*Lela E. Booher*, in *Jour. A. M. A.*

* * * *

Bell, Kick and Edgington, of the Ohio Experiment Station, found in experiments with lambs that a ration consisting of shelled corn, a protein supplement, and timothy hay was low in calcium, although it supplied sufficient phosphorus. When certain groups were given extra calcium, they were superior, not only as to blood calcium, bone ash and strength of bones, as might be expected, but their appetites were keener and they were able to eat more feed. This resulted in a 20% greater average body weight after 182 days.

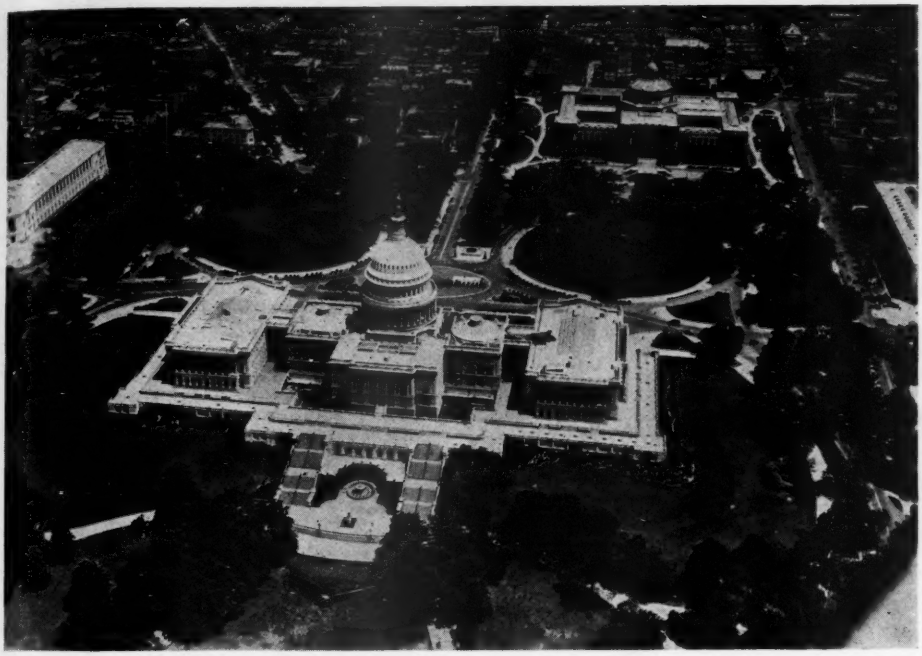
* * * *

Nutritionists are agreed that man should provide himself with a wide variety of foods. In so doing the nutritionist endeavors to make certain that nothing indispensable to good nutrition shall be lacking. This is the only means at hand to safeguard the present lack of knowledge of how to compound a thoroughly adequate diet from chemically known substances. This appeal for variety in food selection is an appeal to sound common sense in view of the limitations of our knowledge of nutrition.—*Lela E. Booher*, in *Jour. A. M. A.*

* * * *

Altogether too much dramatic effort has been released on the subject of vitamin deficiency diseases and on the benefits purported to accrue from ingestion of large amounts of vitamin preparations. The general public has generously responded with purchase of vitamin concentrates to the extent of a money outlay of not less than $100,000,000 during the past year. There are cases of vitamin deficiency diseases in the United States, but by far the larger proportion of these unfortunate persons are among those who have not and could not afford to buy vitamin concentrates.—*Lela E. Booher*, in *Jour. A.M.A.* 114:7.

The Washington Meeting of the A. V. M. A.



The National Capitol, Flanked by the House and Senate Office Buildings, and the Library of Congress, with its Gold Dome, in the Background

NO MEETING ever held by the American Veterinary Medical Association has offered buildings and institutions of historical, political and scenic interest equal to those offered veterinarians who attend the 77th annual meeting in the national capital August 26-30.

Included among the "travel features" that everyone will want to see are: the Capitol, the White House, Mount Vernon, Washington Monument, the Lincoln Memorial, Arlington Cemetery, the tomb of the Unknown Soldier, the Supreme Court building, the Smithsonian Institute, the Corcoran Art Gallery, the Mint, the Library of Congress, and many others.

A tentative program includes:

Monday, August 26—Executive Board meeting and committee meetings.

7:30 P. M.—Meeting of House of Representatives.

Tuesday, August 27—10:00 A. M.—General Session with opening ceremonies.

12:30 P. M.—Luncheon for the ladies and children, followed by a meeting of the Women's Auxiliary.

Afternoon—General session. Speakers: Drs. Wyckoff, Meyer, and Huddleson. Card party for the ladies in the Grand Ballroom.

6:00 P.M.—Alumni dinners (to 9:00).

9:00 P.M.—President's reception, dance.

Wednesday, August 28—9:30 A. M.—Boat trip to Mount Vernon for the ladies.

2:00 P. M.—Men will join ladies at Mount Vernon.

7:30 P. M.—Annual banquet and dance.

Thursday, August 29—9:30 A. M.—Sight-seeing trip for the ladies.

12:30 P. M.—Luncheon for the ladies in the Mayflower; theatre party.

Afternoon—Executive Board meeting.

7:30 P. M.—Second meeting of the House of Representatives.

10:30 P. M.—Final general session.

Friday, August 30—All day—Large and Small Animal Clinic. (Optional trip to the research laboratories at Beltsville, and the Army Veterinary Hospital at Fort Myer.)

Need for State Meat Inspection

Thirty-five per cent of the animals that produce the meat sold to the consumers in the United States are uninspected for health and are killed in plants where no sanitary inspection is conducted. There are in parts of the country municipal inspections which are wholly inadequate and cost the packing industry, the consumer, and live stock producers substantial sums in license fees for which no adequate service is furnished. Such inspected products are in direct competition with federally inspected and wholesome meat products, and prejudice the consuming public against all meat. The consuming public labors under the delusion that all meats are under inspection of the federal Bureau of Animal Industry or adequate state or municipal inspection, which is not true.

It is to the best interest of the consumer, the packing industry, the wholesaler, the retailer, and the live stock producer that these abuses be eradicated.—I. W. RINGER, *Secretary-Manager Retail Meat Dealers Ass'n.*, Seattle, Wash.

* * * *

How can virile pigs be expected when the boar makes 10 to 15 matings in one day? Pasture breeding is an important factor in little pig mortality.

* * * *

Experiments have shown that it is highly desirable to wipe the udder with a clean, damp cloth just before milking. Nearly ten times as many bacteria were found in milk from cows whose udders had not been wiped as in that from cows whose udders had been wiped. It is highly desirable to use a chlorine solution for this purpose.—*Wisc. Univ. Circ. 295.*

* * * *

The percentage of tuberculosis in 27,201 dairy cattle imported into Los Angeles County, California, in the last fiscal year was 1.11—the highest in six years. In a matter of months the last six counties in California will become modified accredited areas, indicating a tuberculosis incidence of less than 0.5%, and the incidence of the disease in imported dairy cattle should fall.

Of the 22 or more known amino acids, nine or ten must be considered as indispensable. That is to say, nine or ten cannot be synthesized by the body at all or not at rates sufficient to supply adequately the body's needs for them.—*Lela E. Booher*, in *Jour. A. M. A.* 114:7.

* * * *

It is not known at present whether or not a deficiency of each one of the indispensable amino acids in the diet produces a specific syndrome. Specific amino acid deficiencies is one of the new problems awaiting the solution for which the work of Rose and his associates has pointed the way.—*Lela E. Booher*, in *Jour. A. M. A.*

* * * *

The *B. suis* frequently remains localized. Thus, porcine brucellosis may be manifested by orchitis or mastitis. Abortion may or may not occur in infected sows.

* * * *

The boundaries between normal variations and frank derangements in health and nutritive state are indistinct. For this reason the boundaries between the science of medicine and the science of normal nutrition lack real definition. The practical aim of the two sciences, namely to improve the physical welfare of man, is one and the same.—*Lela E. Booher*, in *Jour. A. M. A*

* * * *

Garbage Feeding

It is suggested that the feeding of garbage to hogs on a commercial basis be prohibited for the following reasons:

1. Garbage fed pork is a menace to public health.
2. It produces an inferior grade of pork.
3. It creates unfair competition with grain fed pork.
4. It is a disturbing factor on the hog market.
5. Without question government, state, and city health authorities could control this menace.
6. From my experience in garbage feeding and from the general observation I have made, commercial garbage feeding hog ranches are generally very unsanitary and infested with rats.—I. W. RINGER.

NEW VETERINARY BUILDING AT ALABAMA POLYTECHNIC INSTITUTE

This splendid building, which will be completed within the month, was inspected with great interest by the 194 veterinarians who attended the 16th Annual Conference for Graduate Veterinarians at the Alabama school March 20-22. This was the most largely attended veterinary conference ever held at Auburn, a good representation of the profession from Georgia, Mississippi and Louisiana and a few from Tennessee, Florida and South Carolina joining with the Alabama veterinarians to swell the attendance. Guest contributors to the program included J. G. Horning, Houston, Tex., T. A. Sigler, Greencastle, Ind., L. A. Merillat and D. M. Campbell, Chicago, B. M. Lyon, Pearl River, N. Y., Elmer Lash, Washington, D. C., M. R. Blackstock, Spartanburg, S. C., W. L. Stroup, Corinth, Miss., J. L. Hopping and J. E. Severin, Atlanta, Ga., and F. S. Swale, Grafton, Wis. The forenoons were devoted to a literary program; the afternoons to large animal and small animal clinics.

Working with animals, Happ found that a severe rachitogenic diet had no effect upon the hemoglobin level of either young or mature rats. On the other hand, diets low in calcium and vitamin D, but high in phosphorus, produced both rickets and anemia, a syndrome apparently comparable to that of human infantile rickets. The observation suggested that the hemoglobin regeneration was retarded by either high level of phosphorus or low level of calcium.

* * * *

There have been, in certain instances, herds which have failed to free themselves of Bang's disease after a series of consecutive tests, removal of reactors, and proper disinfection of the premises. The number of such herds is less than one-fourth of the total number of herds that showed infection on the initial test. This is a very small percentage of the total number of herds tested when one includes the negative herds along with the infected ones.—*Mo. Agr. Exp. Bul. 388.*

That is to say, the Bang's disease eradication project was highly satisfactory in Missouri herds that were free from the disease.

How to Live to Be a Hundred

For years Professor Henry Sherman has fed two colonies of rats on dietary regimes alike in all respects except that one diet contains one-sixth dried whole milk and the other one-third dried whole milk. Animals have been continued on these diets for more than 40 generations. The rats that received one-sixth dried whole milk have grown very well, reproduced normally, raised their young, and in general have been able to maintain their health throughout life. Their condition might be described as satisfactory. But the colony that received the better diet, the one containing one-third dried whole milk, can be described as superior instead of satisfactory. These rats have grown better, matured earlier, given birth to a larger number of more vigorous young, and a larger proportion of the young have been successfully reared to maturity. They have shown in every way a greater degree of positive health than the merely satisfactory colony. But most interesting of all is the fact that, although the rats of this colony matured earlier, they lived longer and showed signs of senility much later than the first colony.

Dog Hospitalization and Boarding

The wellrun modern boarding kennel is a dog's hotel, or sometimes by necessity, a training college, but it is not a hospital. The veterinary establishment should be essentially a sanatorium and to try to mix the two is as unprofitable as endeavoring to run a boarding school and nursing home together.

Wise veterinarians increase their connection if they seek out the best boarding kennel in their locality and make sure that it is duly patronized. For healthy dogs that at their advice, spend a holiday at such kennel and come home fitter and in better trim than when they went away, enhance the prestige of that veterinarian in the eyes of their owners. His judgment will assuredly be sought again in weightier matters.

But should he try to grab those holidaymakers himself and squeeze them into a corner of his sanatorium, every pimple that they contract from over-eating when they return home, every sneeze they utter months later, will be attributed to "something they caught from all those sick dogs when they were staying with that veterinarian." Words cannot describe what those dog owners and all their friends and acquaintances will say about that veterinarian.

But if he keeps his hands off the canine-hotel perquisites, he will reap a dual benefit, for the boarding kennel in turn will laud his name to the skies. When a case of eczema appears amongst their visitors, the dog's owner will at once be advised to consult the veterinarian. The sulphur ointment in the boarding kennel medicine cupboard will be guarded judiciously for the proprietor's own pet dog.

Under these conditions, if a dog arrives at the boarding kennel with the slightest suspicion of disorder, though he may have booked a holiday of some duration, he will be dispatched without delay to the sanatorium. Whilst if an inmate already installed, should develop so much as a running eye, the veterinarian will be telephoned immediately and the dog's owner informed.

Though the boarding kennel owner may in his heart be convinced that he is as well, or better able to diagnose the symptom as the veterinarian, if he is wise he will refrain from taking the responsibility. It is beyond his sphere. In fact, he would do well to relegate his medical encyclopedia to the attic and place the exercising, feeding and training manual on the top of his desk instead. By so doing he will save the cost of a great deal of disinfectant and enlarge his clientele at the same time.—*Janet Holyoke in Dog World.*

* * * *

Many of our modern drugs are the active principles of plants well known to the ancients and employed by them for therapeutic purposes.

* * * *

Medical Fees 1000 B.C.

Zoroaster prescribed the following scale of professional fees:

"A healer shall heal a priest for a blessing of the just; he shall heal a master of a house for an ox of low value; he shall heal the lord of a borough for an ox of average value; he shall heal the lord of a town for an ox of high value; he shall heal the lord of a province for the value of a chariot and four.

"He shall heal the wife of a master of a house for the value of a she ass; he shall heal the wife of a lord of a borough for the value of a cow; he shall heal the wife of a lord of a town for the value of a mare; he shall heal the wife of the lord of a province for the value of a she camel.

"He shall heal the heir of a great house for the value of an ox of high value."

It would appear from the foregoing that Zoroaster graded the fees of the physicians according to the standing and wealth of the patients, and that the fees for women were smaller than those for men. It would also appear that the clergy then, as now, were regularly on the free list. It is interesting to note that among this early Aryan people, the currency of trade was estimated in terms of cattle, thus harking back to the pastoral period of Aryan history. We get a distant echo of this Aryan pastoral period in our English word, pecuniary, which is of Latin-Aryan origin, being derived from the Latin word, *pecus,* which means herd.—*Edward E. Cornwall, M.D.,* in *Med. Times.*

Chickens Need Veterinary Service

Birds are subjected to diseases caused by viruses, bacteria, fungi, protozoa, nutritional deficiencies and various external and internal parasites. These diseases are as numerous and as complicated as are the diseases of any other species of animal or man, and, for this reason, their solution is equally difficult. In fact, there exists in chickens or birds a disease to parallel almost any disease in any other animal. Thus, chickens have malaria, tuberculosis, typhoid, tumors and pox, all of which are adapted to the bird. At the same time, they have a few diseases actually acquired from other animals such as swine erysipelas and tularemia.—*F. R. Beaudette.*

* * * *

Flower, a British zoologist who has collected data for many years on the age of animals, concludes from his investigations that man is the longest lived mammal. The normal longevity of the elephant he places at 48 years. The oldest hippopotamus of which he was able to obtain an authentic record lived to be 41, rhinoceros 40, lion 25, tiger 19, cat 20, monkey 25 and gorilla 13.

* * * *

Market Classifications of Gallus Gallus

In market classifications, "fowl" connotes the mature hen suitable for boiling—what the consumer commonly calls stewing chicken.

The market classifications of chickens are:

1. Broilers, birds about 10 weeks of age and weighing around 2½ pounds.

2. Fryers, birds three to four months old and weighing 2½ to 3½ pounds.

3. Roasters, birds weighing more than 3½ pounds and up to eight or nine months of age.

4. Capons, desexed birds that have been fed beyond maturity. They may weigh up to eight or nine pounds or even more.

Thus in market classifications the mature hen is fowl and all immature birds and capons are chickens. All classifications of chickens refer to cockerels unless otherwise specified, young females in all classifications being usually referred to as pullets.

Major Walter Reed, discoverer of the mosquito transmission of yellow fever, and Dr. Crawford W. Long, discoverer of ether anesthesia, will be honored soon by special issues of postage stamps.

* * * *

Kuo concluded from an experiment in which 59 kittens were reared with differing environments that rat catching is not instinctive with cats. On the contrary, they acquired the habit of playing with rats just as easily as the habit of killing them, and a fear of rats as readily as a fear of dogs.

* * * *

Tetanus Anatoxin

In a recent meeting of the Académie des Sciences, Gaston Ramon and Edouard Lemetayer set forth the value and duration of the immunity conferred by tetanus anatoxin. Thousands of animals, chiefly horses, have been immunized by the anatoxin with two injections of 10cc at intervals of one month. A little tapioca powder is added to each injection to aid the immunization. A year after the two injections a third injection is administered, likewise of 10cc. This study was conducted for nine additional years. It demonstrated the importance and stability of the immunity conferred by anatoxin. In 127 control horses the antitoxin rate was equal or superior to one one-hundredth of the international unit and often reached one-third. It never went below one three-hundredth. The immunity conferred lasted for at least eight years. Before antitetanus vaccination was generalized, about fifty cases of tetanus were expected out of a total number of 13,000 horses. After six years of regulated vaccination, no case occurred in 16,000 horses.

It is needless to stress the importance of these results for man. The complete, or almost complete, disappearance of tetanus may be looked for through the suppression of the reservoirs of virus. In more than a million persons vaccinated during military service, no serious accident was noted nor any case of tetanus. The present war will probably furnish a new proof of the immunizing effects of anatoxin.—*J'n'l A.M.A.*, 114:5.

The Progress of Veterinary Education in the United States

The rating of a profession is measured by its educational system. As goes the educational program, so goes the profession. The kind and sum of knowledge promulgated, and the use made of it, are the gauge of worthiness. It is, therefore, imperative to understand our veterinary educational system precisely in order to determine in which direction we are traveling on the perpendicular scale. Without a complete survey of the past and present, the prospect of abolishing the flaws is less promising and the future less assuring.

So far as the veterinary colleges are concerned, education in animal medicine has advanced immensely during the past score of years, or since academic standards were tightened up and they became a unit of the general educational system. Until 1920 it could not have been claimed that the American people were much interested in animal medicine. The small expenditures for veterinary colleges compared with the magnitude of the live stock industry establishes this fact beyond controversy. Veterinary education was either of the unconventional sort or was left largely to private enterprise. The private veterinary colleges, which assumed the right of granting degrees, were abolished, but the unconventional sort of veterinary education goes on with increasing momentum, some of it under public sanction and some of it under unregulated, free-for-all private franchise. In addition to the deluge of public literature and short courses on animal medicine, scientific and clinical, intended to edify the public, are the activities of the commercial laboratories, lay and professional, and the specialized private colleges issuing certificates of merit to their patrons. The latter are growing in size and influence and threaten to become more powerful politically than the regular colleges or their equivalents in the universities and agricultural colleges. Politics cuts strange capers and is apt to make strange bed fellows.

The main oversight among veterinarians is that the veterinary colleges which furnish the personnel required to maintain a classical veterinary service in one way or other, do but a small part of the total educating. The budget required to conduct the kind of veterinary education, public and private, that is disapproved by the consensus of medical opinion, runs into astronomical figures compared with total appropriations for our ten orthodox veterinary colleges.

To be more explicit, private educators may be divided into three classes:

1. The makers of stock feeds and remedies, some of whom employ capable chemists, dietitians and clinicians to insure scientific production. This private educational system belongs to the big business class. Its units vary in quality, but its magnitude is not conjectural. One of its objectives is to train the consumer (buyer) of their output by means of correspondence, display advertisements, literature and salesmen. Much of the training is, in fact, veterinary medicine and some of the salesmen practice veterinary medicine contrary to law—diagnose animal disease and prescribe (the products they sell) for it.

2. The commercial firms supplying veterinarians with material and educational literature. This group, too, has developed into the big business class. Its components may be divided into three classes: (a) one cultivating only the patronage of the responsible members of the profession, commonly referred to as graduates of veterinary colleges; (b) one catering to both the graduates and the legally licensed non-graduates, and (c) one making no pretense to upholding the veterinary profession.

The commercial system furnishes a voluminous periodical and some fixed literature of the modern sort, which keeps pace quite consistently with the development of medicine and maintains modern research and production laboratories manned by prominent figures of the profession, who follow closely the minutest details of the clinical

field and who, therefore, occupy key positions in educational work.

3. The special schools, privately owned and managed and patronized by owners or custodians of animals, which graduate "specialists" in poultry medicine, breeding diseases, etc. Several of these have grown to a size, prominence and influence that forecast a new kind of animal medicine for the American people. In view of the fact that veterinary practice laws are weak and largely ignored, and that legalized practitioners receive little outside support when they attempt to enforce them, the end to which this fling at veterinary education will lead is problematic. The position of these schools is strengthened by the fact that public institutions, and public officials, issue permits to poultrymen, swine breeders and stallion owners to practice veterinary medicine, including the handling of certain contagious diseases, and thus set a bad example.

Graduate veterinary education is systematically carried out only in the army veterinary service. Elsewhere it is in its infancy, at least as compared with graduate medical instruction. Veterinary short courses are held at the state colleges in less than half the states. They are praiseworthy, but not attended by those that most need to supplement their more or less remote undergraduate education by such instruction. Clinics held by groups of veterinary practitioners contribute to the improvement of veterinary practice, but in the main need better organization to the end that the demonstrations and discussions be made available to a larger percentage of those attending. Too often they are merely places where a large number of operations which but few can see are performed without explanation. Graduate veterinary instruction is increasing in amount and improving in quality. It probably will not reach those who need it most until it is made in some measure compulsory; *e. g.*, necessary to continuing on the "accredited list" or even to maintaining in force veterinary licenses.

A group of 400 veterinarians attending a "nutritional conference" at Decatur, Ind., July 12, 1939. This conference is held annually and veterinarians attend from four or five states. The large attendance and the close attention paid to the speakers who discuss the latest developments in animal nutrition attest the keen interest of veterinarians in this subject.

As a matter of fact, private veterinary education which was started in 1875 and continued for approximately 45 years, was then discontinued in one form (colleges) to crop up and grow gigantic in other forms, practically out of all control.

We are probably all too busy safeguarding personal interests to maintain good humor when this delicate subject is broached, or perhaps it's the American tradition of acting only when the catastrophe arrives; the "stitch-in-time" policy has never been ours.

Bang's Disease Recommendations*

Your committee again recommends that those producing or distributing Brucella vaccine and Brucella antigen under a government license shall be required to report to the live stock sanitary officials of the various states into which they send Brucella vaccine and Brucella antigen, indicating to whom the vaccine or antigen was shipped, the amount shipped, and the date of shipment. Unfortunately some producers and distributors are not following the recommendations of your committee made on several previous occasions. We believe that this situation is not conducive to the best understanding and works to the detriment of those ethical producers who effectively cooperate in this work. And we further recommend that the Secretary of Agriculture adopt ruling for control and elimination of Bang's disease similar to Regulation 7 adopted July, 1919, for the control and elimination of bovine tuberculosis, and if legislation is necessary for such ruling that Congress be memorialized to adopt such law.

Proposed Regulations Providing for Accredited Bang's Disease Free Areas

The extent of the area shall be determined by state and federal agencies cooperating. When testing is started the area shall be placed under quarantine and the following rules shall be enforced.

Sec. 1. All cattle, except steers and cattle for immediate slaughter, when moved into a quarantined area, shall be handled according to the following rules:

Sec. 2. Cattle from negative herds in accredited Bang's disease free areas or herds officially accredited Bang's disease free, according to recognized standards, may enter the area without being retested for Bang's disease. All such cattle shall be identified and shall be accompanied by approved certificates.

Sec. 3. All other male or female cattle, except steers and cattle intended for immediate slaughter, shall be required to pass a negative officially recognized agglutination test for Bang's disease within 30 days prior to the date of entry and shall be maintained in quarantine separate from other cattle and be retested in not less than 30 or more than 60 days after the date of entry. If found free, they shall then be released from quarantine.

Sec. 4. All cattle six months of age or over, except steers, in the area shall be tested for Bang's disease and all cattle reacting to the agglutination blood test for this disease in dilutions of 1:100 or more shall be slaughtered within 15 days of the date of the test and all premises where such reacting cattle were located shall be cleaned and disinfected within 15 days of the date of the removal of the reacting animals. The milk and milk products derived from reacting cattle shall not be used or sold unless properly pasteurized.

Sec. 5. If, as a result of a test of all the cattle required to be tested according to the provision of Section 4 above, the number of reactors does not exceed 1% nor the herd infection exceed 5%, the area may be declared an accredited Bang's disease free area for a period of three years by the state and federal cooperating agencies in charge of the work, provided that all infected herds shall be placed in quarantine and the cattle in them retested for Bang's disease at intervals of from 30 to 90 days until all of them pass two consecutive negative tests and pass a further negative test not less than six months from the date of the second negative test. And further provided that herds in which Bang's disease vaccine is being employed shall be maintained under strict quarantine, and for purposes of herd percentage, be classed as infected herds.

Sec. 6. At the expiration of the three year period the area may be accredited for an additional three year period if not less than 10% of all the herds, including 10% of the cattle six months of age or over, ex-

*Report of the Committee on Bang's Disease to the 43rd Annual Meeting of the United States Live Stock Sanitary Association, Dec. 6-8, 1939. The committee personnel was: V. S. Larson, Chairman, H. C. Givens, A. E. Wight, C. D. Stubbs and Chas. E. Cotton.

cept steers, are retested and all herds located in the area that were found to contain reactors upon the last complete area test or county check test for Bang's disease, are retested, provided that the percentage of reactors among the cattle retested does not exceed 1% of all the cattle tested in the area.

Sec. 7. In areas where the percentage of reactors to the test for Bang's disease was more than 1% of all cattle tested, the procedure for reaccreditation of counties should be in accordance with methods outlined in section 4 above.

Your committee on Bang's Disease in 1931 as a part of their report included a table on the interpretation of reactions to the agglutination test for Bang's disease. This table was as follows:

Dilutions			
1:50	1:100	1:200 to 1:250	Diagnosis
—	—	—	Negative
I	—	—	Suspect
x	—	—	Suspect
x	I	—	Suspect
x	x	—	Positive
x	x	I	Positive

This has stood the test of time. It is still in the light of our present knowledge the most reliable guide we have for the interpretation of the agglutination reactions for Bang's disease.

* * * *

The Council on Pharmacy and Chemistry of the American Medical Association has functioned for 35 years. Two of the present members of the Council have served continuously during this period — Professor Emeritus Robert A. Hatcher, of Cornell University Medical College, and Dean Torald Sollmann, of Western Reserve University School of Medicine. The Council reports to the medical profession on matters of materia medica, judging products according to a set of rules available to both physicians and manufacturers, and its conclusions, whether the drug in question is accepted or rejected, are published in the *Journal of the A. M. A.* No fee is accepted for the consideration of submitted preparations, and the members of the Council, with the exception of the executive secretary, serve without remuneration.

The prayer that has been mine for twenty years, that I might be permitted in some way or at some time to do something to alleviate human suffering, has been granted. —*Walter Reed,* in a letter to his wife.

* * * *

In 1932, hog cholera cost Canada $175 per million hogs. During the same year it cost the United States $500,000 per million hogs. Canada uses the slaughter method for the control of hog cholera; in the United States we permit farmer vaccination.

* * * *

Because the freely chosen diets of individuals vary so widely in combinations of proteins, it is important to allow a liberal margin of safety on protein intake, hoping thereby to secure adequate amounts of all the essential amino acids. It is also imperative to recommend that milk, meat, eggs, cheese and fish supply a good proportion of the protein allowance.—*Lela E. Booher,* in *Jour. A. M. A.* 114:7.

* * * *

The only sound and permanent solution to the problem of malnutrition is to educate the people and adjust the economic situation so that everybody can share the benefits of a steady, well balanced diet. To do this occasions the need for a much larger consumption of the so-called protective foods—eggs, dairy products, tomatoes, citrus fruits and leafy green vegetables.—*Lela E. Booher,* in *Jour. A. M. A.* 114:7.

* * * *

That there is a relation between brucellosis and Hodgkin's disease is indicated by preliminary reports by Parsons, Poston and Wise of Duke University. In several cases in which the morphological changes were characteristic of Hodgkin's disease, Brucella organisms (porcine or bovine strains) were obtained in cultures from the enlarged glands. The microscopic changes included complete destruction of the normal architecture of lymph nodes, eosinophilia, areas of fibrosis and production of large, pale mononuclear cells and giant cells.

English Army Veterinary Service in the Present War

Since the outbreak of hostilities our Corps [Royal Army Veterinary Corps] has undergone a considerable expansion. With the expectation of a comparatively limited number of horses to be dealt with, it cannot be claimed that our peace-time arrangements were completed to provide for the expansion that has been required of us.

Nevertheless, we feel that the extended organization and considerable increase in the Corps have been carried out efficiently, in spite of the fact that during the process of expansion we have had to cope with enormous numbers of sick animals, due largely to a serious epizoötic of strangles.

Naturally, the amount of work at the beginning fell on the shoulders of the Regular officers, N.C.O.'s and men of the Corps who were serving at home on mobilization.

On the day following mobilization most of our Reservists had reported for duty. Although it had been necessary for them to leave their homes and families at very short notice, they arrived in good spirits and ready for any call which would be made on them.

Very soon we were joined by veterinary officers and N.C.O.'s of the Territorial Army (reserves). Their veterinary activities had for some years been rather limited and also their conditions of service had been somewhat unsatisfactory. With their embodiment into the Regular Army all this has changed; they now have full scope for their energies, and they have given invaluable assistance to the Corps.

We have also been fortunate in the return to the active list from the Reserve of some officers of outstanding ability.

The officer strength of the Corps has also been increased by the granting of emergency commissions to some young veterinary surgeons. We welcome them to the Corps, and we feel sure that the opportunity for gaining valuable experience in their profession will be unique.

A considerable number of recruits have been enlisted into the Corps, and fortunately we have been able to obtain men with previous experience in the care and management of horses.

Thus in the space of a few months we are once more a Corps of considerable size, and we feel capable of undertaking any tasks which may be required of us.

We recall with pride the achievement of our Corps during the last war, and the many appreciations given to us by the Higher Commands.

Although owing to the extensive mechanization which the Army has undergone the numbers of animals employed in the Army will be much smaller than during the last war, we feel that it is highly probable that our duties will undergo a steady and progressive expansion.

It may be that owing to the small incidence of mange in horses in England in recent years we have been lulled into a false sense of security, but the fact that cases have already occurred shows that we must constantly be on our guard against its introduction and spread amongst Army animals.

The treatment of wounds with cod-liver oil in conjunction with jaconet appears to have much to recommend it and to be well worth giving a trial. It was used extensively during the Civil War in Spain, and it appears to be especially suitable for use in veterinary surgery.

Our knowledge of the parasitic diseases of animals has made great advances since the last war. The diagnosis of parasitic infestations by fecal examination has been investigated and simplified and our methods of treatment by anthelmintics have been improved greatly. Observations on the treatment of strongylosis with phenothiazine carried out at the Royal Army Veterinary Corps laboratory suggest that in phenothiazine we may have a useful anthelmintic for combating many cases of debility. One recalls during the last war the large numbers of horses with chronic debility, and one cannot help thinking that with the more advanced knowledge we now possess much could have been done in the treatment of such cases.

Many diseases which are comparatively rare, occurring only in isolated cases in

peace time, have a tendency to assume serious epizoötic proportions in war time. In this connection we recall the serious epizoötics during the last war of such diseases as ulcerative lymphangitis, periodic ophthalmia and stomatitis.

Each war brings about new problems in veterinary medicine and surgery, in addition to those, such as mange and glanders, met in previous campaigns, and there is always abundant opportunity for observation and investigation.—*Jnl. of the Royal Army Veterinary Corps,* Aldershot, England.

* * * *

Disease overshadowed the casualties of the fighting in the Mexican War of 1846-47, in the course of which 10,986 died of typhoid, dysentery, smallpox, malaria and tropical diseases, while only 1,549 were killed or died of wounds; in the War Between the States disease struck down 200,000 men and battle wounds 112,000; in the Spanish-American War 4,955 died from disease and 379 from injury; the World War saw 58,119 dying from disease and 50,385 from injury.

* * * *

During the World War the breeding and exhibiting of pure-bred dogs in both England and Germany came to a practical stand-still. In the last year and a half of the war England was forced to close her stud books; no dogs could be registered and breeding restrictions were absolute. In this period all dog shows were banned except two or three which were held for charitable purposes. Had the war lasted any longer it would have meant the possible extinction of a number of breeds and as it was much valuable foundation stock was lost.

In Germany actual conditions were even worse than they were in England. The German army in many cases used dogs for patrol service in both the medical and combat units and for this reason the government hesitated to suppress all breeding operations. The majority of the breeders, however, were at the front and the food shortage in Germany was so acute that owners were forced to destroy valuable and highly-prized stock.—*Dog News.*

Noted Veterinary Officer Dies

Major General Sir John Moore, K.C.M.G., C.B., F.R.C.V.S., Director of Veterinary Services of the British Expeditionary Force in France during the World War, died February 11 after a long illness.

General Moore was born May 24, 1864, was graduated from the Royal (Dick) Veterinary College in 1885, winning a gold medal, four silver medals, and the Second Fitz-Wygram prize. He was commissioned in the British army as Veterinary Surgeon in 1889, promoted through the grades to Major General January 1, 1918, and retired on reaching the statutory age limit in 1921.

Employed with the Remount Purchasing Board, he had charge of the shipment of horses from Argentine to South Africa in 1898. Coming to the United States in 1900 he held the appointment of Commandant of the Lathrop (Missouri) Remount Depot through which 90,000 horses and mules passed destined for South Africa. In 1904 he again visited the United States and prepared the scheme for purchasing horses that was followed during the World War.

August 5, 1914, he proceeded to France as Director of Veterinary Services of the B. E. F. His rank at that time was Brigadier General. The corps under his command numbered 767 officers and 16,400 enlisted. The veterinary hospitals under his charge contained an average of 35,000 patients.

After his retirement from the military arena, General Moore engaged actively in professional matters, becoming in turn a Governor of the Royal Veterinary College, member and for six years Chairman of the Editorial Committee of the National Veterinary Medical Association, member of the Council and later President of the National Horse Association, Veterinary Surgeon to the London County Council, member of the Agricultural Research Council, the Economic Advisory Council, the Tuberculosis Committeee of the Medical Research Council, President of the Section of Comparative Medicine of the Royal Society of Medicine, and many other positions of trust and honor.

As a result of the accumulated evidence of vitamin B_1 deficiency in the modern diet, Cowgill advocates the prosecution of a program for fostering addition of this vitamin to staple American foods.

* * * *

A zoologist says that there is no known way of telling the age of an adult bird by looking at it—loss of feathers, state of beak or claws may indicate disease, but not old age.—*S. N. L.*

* * * *

Pregnancy urine in doses of from 10 to 20cc administered every two or three days to four- or five-months old swine, was found to increase the average daily rate of gain 115gm compared with the gains of a control group, according to E. P. Tschernozatonskaja. The pregnancy urine also caused permanent inhibition of sex activity.—*Exp. Sta. Rec.*, Vol. 75, p. 34.

* * * *

In Kansas, infectious encephalomyelitis was observed in horses and mules of all ages, during 1939, but the younger animals seemed more susceptible. Something over 22,000 horses and mules were known to have been vaccinated with "chick" vaccine; none of these subsequently contracted the disease, and no deaths were reported among these animals.

* * * *

Polydactylism, consisting of an extra toe on the front feet, occurred in 13 of the 125 Duroc Jersey pigs at the California Experiment Station. These pigs were the progeny of closely related parents. The anomaly occurred in males and females in about equal proportion.—*E. H. Hughes.*

* * * *

The veterinary corps of the Army, during the fiscal year ending June 30, 1939, inspected before or at the time of purchase 162,157,724 pounds of meat, fish, and other food products of animal origin and rejected 9,324,505 pounds. The difference in value of the food rejected as not complying with specifications and that finally supplied by the contractors is estimated at $579,150.24, which represents the monetary saving to the government effected by the inspection.

Veterinary Practitioners Organize

As announced last month, a mass meeting of veterinary practitioners was held in Kansas City, March 14th and 15th, for the purpose of organizing a national association of veterinary practitioners.

The new organization adopted the name "American Society of Veterinary Therapy," adopted a constitution and by-laws, and elected the following officers: President, H. W. Young, Kansas City, Mo.; first vice-president, Geo. A. Hawthorne, Clarinda, Iowa; second vice-president, Rease Mitcham, Little Rock, Ark.; secretary-treasurer, J. C. Flynn, Kansas City, Mo.; executive board, S. L. Stewart, Olathe, Kans.; S. R. Espy, Oklahoma City, Okla.; N. M. Bader, Galveston, Texas; L. A. Tischhauser, Garnavillo, Iowa, and F. H. Suits, Odessa, Mo.

A state secretary is to be appointed for each state, to direct the program of the association in the various states. At the present time the membership includes veterinarians in 18 states, but it is planned to effect a local organization in each of the 48 states at an early date. The annual dues were set at $5.00.

The headquarters of the organization will be located at Kansas City, at least for the present, where a central office will be established to guard the interests of practitioners and to work to improve the conditions surrounding veterinary practice.

The association will cooperate fully with the American Veterinary Medical Association and one of its prime objects is to improve the program of the general practice section of the latter organization. Dr. Cassius Way, president of the A. V. M. A., attended the meeting and made the principal address. He also spoke at the banquet held the evening of March 14th.

The organization will hold annual meetings during the week of the annual meeting of the A. V. M. A. and in the same city. It is not planned to present any scientific program at its meetings, but rather to confine consideration to business matters and measures for the advancement of veterinary practice.

The Veterinarian in the Philippines

By WALTER BUCHLER, London, England

THE Philippine veterinary college graduates receive the title "Doctor of Veterinary Medicine." The work of a veterinarian in the Philippines is not very different from that of a veterinarian in the United States. Most veterinarians in the Philippines handle diseases of animals, both infectious and non-infectious, and the various surgical diseases.

Many veterinarians are employed in the Bureau of Animal Industry of the Philippines. Some are teaching veterinary subjects in the College of Veterinary Science, University of the Philippines, and technical subjects in the secondary schools; others are employed as managers of private stock farms and some go into private practice. A number are with the Philippine constabulary.

Veterinarians are trained in the College of Veterinary Science, University of the Philippines, which offers a four-year course leading to the degree of D.V.M. It is planned, however, to extend the course by one year. Along with their training in the college, some veterinary students also acquire experience at the various government live stock farms, private veterinary hospitals and local biological laboratories.

As in other countries, horses, cattle, hogs, fowl, and pet animals are the animals with which the local veterinarians are most concerned. The caraboa, however, is peculiarly a Philippine animal.

The conditions principally encountered are infectious and non-infectious diseases and surgical ailments similar to those found in other countries. Among the infectious diseases are: rinderpest, hemorrhagic septicemia, foot-and-mouth disease, tuberculosis, anthrax, Texas fever, contagious abortion, both bovine and porcine, rabies, strangles, tetanus, influenza, epizootic lymphangitis, glanders, hog cholera, swine plague, distemper, avian pest, fowl cholera, chicken pox and roup.

Diseases caused by internal parasites like strongyles in horses, kidney worms in pigs, stomach worms in cattle and goats, tapeworms, ascaris and filaria in dogs exist in the Philippines. Cattle and dog ticks, lice and fleas are among the common external parasites of animals dealt with by local

Army Veterinary Hospital, Fort William McKinley

veterinarians. Among surgical diseases often brought to the attention of a veterinarian are spavin, tumors, ringbone, hernia, abcess, etc.

In only a few instances is the treatment of diseases, either medical or surgical, not in line with the practice followed in the United States. Treatment employed in cases of rinderpest, surra, epizoötic lymphangitis and even tetanus are somewhat different from the methods employed by veterinarians of other countries.

Local veterinarians use instruments imported from the United States, Japan, England, and Germany. The American instruments are the most popular, perhaps due to advantages in educational and market relations. The Japanese are beginning to sell in the local market some veterinary instruments which are copied from those manufactured in America. German-made instruments are in some cases cheaper than those from America, but the latter excel the former in appearance. The quality, however, appears identical.

Veterinary pharmaceutical preparations are similarly imported either directly or through their respective agents in the locality. A few preparations are produced in the Philippines among which are rinderpest, hemorrhagic septicema, rabies, anthrax, fowl cholera, chicken pox and roup vaccines, hemorrhagic septicemia serum, and others produced by the Bureau of Ani-

mal Industry. The Laboratoria Arguelles also produces some preparations for local consumption.

Chemotherapeutic agents are in general use by Philippine veterinarians. No particular preparations show prospect for great demand, although antiphlogistine, mallein, tuberculin, anti-distemper serum, bacterin against strangles, arecoline tablets and calcium gluconate are imported. No local firm is engaged in the manufacture of chemical products, all drugs being supplied by the prominent local drug stores.

Private practice has progressed slowly. The increase of animals in quality and quantity, the growing interest of the people in their animals and the belated recognition of the services of the veterinarian, however, are potent factors bound to increase the scope of private veterinary practice in the Philippines.

* * * *

A gain of 30 pounds in weight adds 18 miles of blood vessels to the vascular system of a man.

* * * *

Much Needed Prophylaxis

"The newborn baby whose mother has received proper prenatal care is healthier today than ever before. The modern mother, too, is better protected during pregnancy and lactation than any of her predecessors. One factor in this achievement is the routine administration, to expectant and nursing mothers, of a dependable vitamin supplement."

The foregoing is so universally recognized among physicians that it would not occur to anyone as being necessary to state it at a medical meeting and the public is measurably aware of the necessity for professional prenatal and infant care. Live stock raisers, on the contrary, care for the dam and the young animal according to the precepts of their grandfathers; the result being an appalling loss in breeding efficiency and baby animals. Veterinarians can serve their clients in no other way so profitably as by instructing them in the better care of their animals during the period of gestation and of the young from birth to weaning.

The Use of the Stomach Tube in Large Animals

Of all the instruments made use of by practitioners, none gives better results than the stomach tube and pump, and when skillfully done nothing makes a better impression on a client, since this manner of administering medicants cannot be duplicated by laymen.

Technic.—I prefer the 10-foot, 1 1/16 inch Cahill tube. It is small enough to pass through the nasal passages of any horse without injury. The animal should be backed into a single stall. A twitch is applied to the lower lip. If the animal is unruly, the ears may be grasped and twisted by assistants. The tube should be washed with warm water and soap and then coated with mineral oil. The end of the tube is inserted into the nostril and pushed down to the floor of the nasal passage with the index and second finger, to avoid injury to the turbinate bones. When it reaches the throat it meets with some resistance. Swallowing then occurs and the tube is pushed smartly and can be seen descending the esophagus. It can be pushed as far as the stomach; this, however, is not necessary in administering medicine. One must be sure that the tube does not go down the trachea. If it does enter the trachea, it slides down without resistance and breathing can be heard through it; if it goes very far coughing results. I always make it a point to see the tube descend the esophagus from the outside. If it meets with resistance in the nostril or is blocked, I do not use force, but try the other nostril, where it usually goes down. When both passages have been blocked, I use a speculum and pass the tube through the mouth. A tube should never be worked back and forth in the nasal passage as this results in hemorrhage; and while this does no serious injury, it often disturbs the owner.

Uses.—I use a stomach tube and pump for impactions in horses more frequently than for any other condition. Supose that you are called to see a "colicky" horse. The owner has made an unsuccessful attempt to drench the animal with "salts." You ar-

rive, examine the animal, and call for warm water, soap and a towel. The owner goes to the house, heats the water and brings it and the soap while you stand around and swap yarns with the neighbors who have assembled to help. You send him back after a towel and cold water to temper the first he brought. On examination you find the rectum nearly empty and pull out some fecal matter and show the owner how hard it is. You emphasize the fact by throwing it against the side of the barn. On further examination you find the left dorsal colon pushed back and hard, which confirms your diagnosis. You describe the case to your audience. There will always be one in the crowd who "knowed it was a compacted bowel." You call for more water and buckets and proceed to mix your purgative. I prefer one-half gallon of mineral oil, magnesium sulphate one pound, carminatives, and five to ten gallons of water. Give chloral hydrate if needed. In my territory, the stomach tube is still a novelty and the chances are the owner has never seen it used. You pass the tube, pointing out its progress down the esophagus to his surprise and your satisfaction. When the tube reaches the stomach you are usually rewarded by an eruption of gas and a sour odor. You then pump in the oil and medicants. This procedure may have to be repeated but this treatment saves more cases of impacted bowel than any other, and even the "friend" who confirmed your diagnosis knows that if your treatment fails to soften the impaction nothing else will. If it fails, the owner knows that you have made a sincere effort to save his animal.

Other uses of the stomach tube and pump are relieving gas pressure in the stomach and rumen, irrigations and enemas, treating heat stroke, etc. I feel that this instrument should fill a larger place in veterinary medicine because its proper use is an art in itself. It cannot be duplicated by laymen. It can be performed on most horses, and the animal gets the full dosage safely.

G. W. BAYLES.

Marion, Ill.

Well-Known Italian Scientist Goes to Middlesex School

PROF. ALBERTO ASCOLI

Dr. Alberto Ascoli, an Italian scientist internationally known for his discoveries in the field of animal disease control, has been appointed Professor of Bacteriology and Immunology at Middlesex University School of Veterinary Medicine for a term of years beginning in June. Professor Ascoli received the degree of Doctor of Medicine from the University of Vienna in 1901 and subsequently from the University of Pavia, where he became a professor in physiological chemistry.

He joined the faculty of the University of Milan as professor of veterinary hygiene in 1910, and served as subdirector at the Serotherapeutic Institute of that University from 1908 until the end of the World War and as director of the veterinary school of the University of Modena later. In 1920 he became professor of pathology in the veterinary school of the University of Milan, where in 1924 he founded the Instituto Vaccinogeno Antitubercolare.

The Italian anti-semitic decrees forced his resignation from the University of Milan in October, 1938, and Doctor Ascoli came to New York to attend an international congress on microbiology last summer. He has since then been in residence at Columbia University as a visiting scholar.

Doctor Ascoli is the author of 180 books, papers, articles and reports dealing with the prevention and control of infectious diseases by methods of immunology, serology, and vaccination. His original contributions have been of great value in the war against tuberculosis, anthrax, dysentery, and the deadly brucella organisms. He has delivered addresses before international scientific associations, including the 11th International Veterinary Congress, the Hungarian Veterinary Association, and the Veterinary Academy of France. Besides engaging in teaching activities at Middlesex University Veterinary School, Doctor Ascoli has outlined a program of research on the control of Bang's disease.

Recent Materia Medica

II. Vitamin A

By PROF. VICTOR LEWITUS
Nutley, New Jersey

Historical

The work of Stepp (1909-1912) presented the first experimental evidence of the existence of some indispensable dietary factor associated with lipoidal substances. Following this, McCollum, Davies and Kennedy (1912-1916) accumulated data that showed that butterfat secured prolonged growth in animals when added to diets which would not otherwise support growth. Osborne and Mendel obtained similar results. It was also found that egg-yolk fat had like properties, but the addition of other fats (such as lard or olive oil) resulted in failure to induce such growth. Thus, the fat-soluble vitamin A was first recognized.

Sources

In animals, vitamin A is stored in the liver, fat tissue, milk (butterfat), egg-yolk, glands, etc. Plants contain the precursors of vitamin A—alpha, beta, gamma-carotene, cryptoxanthin. Beta-carotene appears to be the most abundant and most efficiently utilized of the four precursors. The synthetic form of this vitamin is not yet commercially important. The most common source at present is fish-liver oils or their concentrates.

Chemistry

Karrer and his associates have determined the chemical constitution of carotene as well as that of vitamin A. The vitamin was isolated by Holmes and Corbet (1937). Fuson and Christ (1936), and Kuhn and Morris (1937) have reported its synthesis. Its tentative formula is: $C_{20}H_{29}OH$.

Properties

Since vitamin A has the ability to form compounds with proteins, fatty acids and bile salts in the body, it is likely that it is absorbed as a bile compound and stored as a fatty-acid ester. Wald has indicated the relationship between a certain protein compound of vitamin A and the visual purple of the retina. Vitamin A is fat-soluble and therefore occurs in the adipose tissue of animals, in the oils of fish livers, in egg-yolk, in milk and in butter. The extent to which the various precursors of the vitamin, contained in plants, can be converted into vitamin A by different species of animals, has not been established.

Stability

Under certain conditions, heat causes the oxidation of the vitamin and it loses its activity. Under ordinary conditions it loses its potency gradually when exposed to air. Rancidity of fish oils or fats accelerates destruction of the vitamins. For this reason, many reputable manufacturers charge vitamin-A preparations with excess carbon dioxide. However, it must be remembered that when containers are opened for ordinary use, exposure to the elements occurs and gradual loss again begins. Vitamin concentrates (in which much of the oil is removed from the vitamin) may be preferable, especially when properly coated or sealed in gelatin capsules or "perles."

Assay or Standardization

The international unit of vitamin A may be defined as the growth-promoting activity of 0.0006mg (0.6 gamma) of crystalline beta-carotene, $C_{40}H_{56}$. One U.S.P. unit of vitamin A is equal, in growth-promoting and anti-ophthalmic activities for the rat, to one international unit of vitamin A (adopted by the Conference of Vitamin Standards of the League of Nations). In testing vitamin potency, immature rats are placed on a vitamin-A-free diet until their weight becomes stationary or falls. Naturally, the rats continue to grow for some time until the stored vitamin A is depleted. Once the body supply is completely exhausted, the animals begin to lose weight and develop certain deficiency symptoms, principally in the eyes and respiratory tract. This usually requires six weeks. A standard preparation (U.S.P. XI reference cod-liver oil containing 3000

I.U. per gram) must be tested concurrently with the unknown. Comparisons are made to standard growth curves relating dosage to gain in weight. At least 10 animals are used in each of the groups, and for obvious reasons growth response is determined on one sex.

Functions

Vitamin A is known to:

1. Maintain normal integrity of the epithelial linings (eyes, respiratory tract, alimentary tract, etc.).

2. Prevent and heal certain ocular disturbances (nyctalopia, xerophthalmia, keratomalacia, etc.).

3. Prevent certain dermatoses (furunculosis, impetigo, follicular hyperkeratosis, etc.).

4. Maintain proper growth and weight relationships.

5. Influence, together with vitamin D and minerals, the proper tooth structure of animals.

6. Act with other vitamins, such as vitamin G, in maintaining normal health.

Manifestations of Deficiency

Wolbach and Howe were the first to show that when vitamin-A deficient diets are fed to animals, marked changes occur in the epithelial cells. In place of the normal cells, stratified, keratinized epithelium is formed. The respiratory mucosa appears to be affected first, then the salivary glands, then the eyes, the glands of the alimentary tract, the para-ocular glands, and, lastly, the pancreas. In rats suffering severe avitaminosis-A, besides the production of the eye lesions, hair loss and growth retardation, the keratinization is found in the nose, larynx, trachea, bronchi, salivary glands, bladder, ureters, kidneys, uterus, oviducts, prostate, epididymis, seminal vesicles, conjunctiva, cornea, lacrymal glands and thymus. Simultaneously, subnormal development of the tooth enamel also occurs. Other workers have reported parallel findings in humans suffering from the same deficiency.

Skin lesions are an early sign of vitamin A shortage. Abnormal dryness or scaliness, dry and falling hair, keratosis (most conspicuous in the hair follicles), and sometimes papular eruptions manifest themselves.

One of the earliest symptoms of avitaminosis-A is night blindness or nyctalopia. According to the work of Wald, light striking the visual purple of the retinal cones, bleaches it to a visual yellow. A portion of the yellow will revert, in the dark, to visual purple; another portion undergoes decomposition into a protein and vitamin A. The rate of formation of visual purple, once exposure to light has occurred, is dependent upon the available supply of vitamin A. When regeneration of the visual purple is incomplete, nyctalopia exists. Based on this principle, the aptitude of visual-purple regeneration in the retina is tested in humans by means of photometers or bio-photometers, the object being to determine the presence and also the degree of A-avitaminosis.

Declining weight, skin lesions about the eye, divergent strabismus, and muscle weakness are all characteristic of vitamin A deficiency in the dog.

Xerophthalmia was one of the first signs to be detected in mammals, such as rabbits, as an index of vitamin-A deficiency. Nutritional xerophthalmia is diagnosed, in humans, by the presence of opaque whitish deposits on the scleral conjunctiva; these are referred to as Bitot's spots.

Keratomalacia represents an ocular condition resulting from a severe and prolonged vitamin A shortage. It is a case of xerophthalmia which has progressed to a severe degeneration of the cornea, followed by perforation. Permanent blindness usually results from this condition. Ocular symptoms are usually associated with other deficiency

symptoms, such as skin lesions or epithelial degeneration.

The experimental work of McCollum and Davis leading to the discovery of vitamin A has already been mentioned. It emphasized the role of the vitamin in growth maintenance. This fact forms the basis of assaying methods for standardization of this vitamin. Stunted growth does not necessarily signify vitamin A deficiency, but an inadequate supply will result in failure to grow, once the animal stores have been exhausted.

The influence on dental development in animals, along with other factors, is considered an additional role of vitamin A. Its lack appears to induce structural tooth abnormalities. When deficiency exists, the soft periodontal tissues are affected, as evidenced by atrophy and metaplasia of the enamel organs. The enameloblasts are replaced by stratified squamous epithelium. This loss of enamel allows exposure of the dentin, and the teeth acquire a chalky character. The odontoblasts likewise are influenced, and their atrophy stops tooth development.

At one time, vitamin A was called the anti-infective vitamin, but this caption was misleading since there is no established evidence that once infections are firmly established the vitamin is capable of combating them. That vitamin A maintains normal integrity of the epithelial cells has already been indicated, and in this way it may serve to lessen the possibility of infection.

The question of urinary calculi is a moot one. Success has been reported in reducing the incidence of this condition by means of hypervitamin-A diets, the object being to prevent the precipitation of salts that contribute to stone formation. There have been contradictory findings along these lines, and it is best to consider the question as still being in the experimental stage.

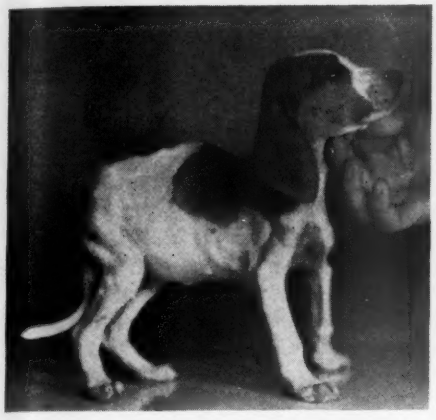
Hamilton has recently stated that vitamins A and D are probably the only two vitamins of importance in live-stock feeding, since these are probably the only vitamins that are likely to be present in insufficient quantities in rations consisting of natural feeds.

In a discussion of deficiency diseases of various animals, Hart explains that cattle have frequently developed abnormalities which they acquired because of partial subsistence on dry forage. The absence of vitamin A has largely been suspected of being the cause. He explains that cattle on the range, grazing on green feed, store vitamin A or its precursor carotene in the body fat or in the liver. A condition termed "carotenosis" by the federal Bureau of Animal Industry, has recently been discovered and is considered to be due to excessive accumulation of this material in the liver with degeneration of the liver cells ending in cirrhosis. Hart believes that probably the liver oil of cattle is a better source of vitamin A than that of cod-liver oil. In drought seasons, cattle on dry feed for extended periods suffer from deficiency symptoms, first of which is night blindness, a symptom often missed unless suspected. Later incoordination of movements and even blindness occurs. This stage of vitamin A deficiency is commonly seen in steers on cottonseed meal or similar rations low in the vitamin, and so-called "cottonseed poisoning" occurs. Sometimes, the deficiency results in premature expulsion of the fetus in pregnant cows, simulating infectious abortion; ocular lesions of younger animals, resulting in corneal ulcers simulating severe keratitis, may occur; and a condition closely resembling white scours is seen in new-born calves as marked diarrhea, terminating fatally in a few days. Hart and Guilbert have pointed out the differential diagnosis of these conditions.

In the case of hogs, it has been observed in the Pacific coast areas that barley fed these animals contains insufficient amounts of vitamin A. For this reason, alfalfa pasture appears to be extremely necessary to supplement such rations. It appears that vitamin A deficiency has much to do with preventing resorption of the fetus, though there are probably other vitamins, such as E, involved in such conditions.

Crimm and Short, working with dogs to determine the amount of vitamin A needed, noted a shift to the left in the Arneth leucocyte count, and a gradual onset of nutri-

tional anemia. On analysis, the livers of seven dogs were noted to be depleted of their vitamin A reserve. Based on the amount of vitamin left in the livers, and the



Advanced Vitamin A Deficiency

amount utilized from what was fed, the authors estimated the weekly requirement of dogs to be from 157 to 330 international units per kilogram body weight. Mellanby has recently found that diets deficient in vitamin A may cause deafness in dogs. In the course of a few months, the cochlear division of the auditory nerve may be completely destroyed.

In turkeys under dry range conditions, the symptoms of avitaminosis-A include droopiness, swell head, and pustules in the throat. In poultry outside the yellow corn belt, a high incidence of nutritional roup due to vitamin A shortage occurs. Serious mortalities occur unless green feed of some kind is promptly supplied. Symptoms include weakness, emaciation, swelling of the face, small pustular patches on the mucosa of the mouth and throat, and (on post-mortem examination) pale kidneys with accumulated urates. Green feed, cod-liver oil, or other sources of vitamin A prevent or relieve the condition.

Moore has recently observed that calves develop nyctalopia, papillary edema, and a permanent type of blindness associated with constriction of the optic nerve when fed rations low in carotene content. These conditions may be prevented by supplementing the diet with carotene-rich material or vitamin concentrates. Syncope seems to be a prominent symptom of A-avitaminosis in these animals and the signs persist even after long periods of proper dietary provision. Bleaching of the tapetum lucidum of the retina appears to be a good guide for diagnosing vitamin A deficiencies in the bovine species.

Very recent work by Kimble and Gordon points to the possibility of synergism between three of the vitamins. They found that individuals having a low blood vitamin A level, were sometimes not restored to normal by administration of vitamin A alone. In many cases, the simultaneous administration of vitamin C and riboflavin (vitamin G) together with vitamin A effected cure of the deficiency syndrome. This points to a condition which has long been suspected, namely that there must be some degree of interdependence of the vitamins.

Frohring, experimenting on several hundred puppies, found that the absence of vitamin A in the diet usually results in some effect on the eyes, but that complete absence of vitamin A causes different results from those produced by insufficient curative doses after the animal's stores of vitamin A had been depleted. He reported xerophthalmia especially in the pop-eyed breeds, indicating the importance of irritation, as well as vitamin deficiency, in the causation of this condition. He also found corneal opacities and a divergent strabismus in a large number of animals. He noted that infections of the eyes developed particularly in those animals that received insufficient curative doses after depletion. This last observation is interesting from the standpoint of possible clinical significance. Patton has recently stated the minimum daily vitamin A requirement for dogs to be 60 U.S.P. units per kilogram of body weight.

It has been estimated that laying hens require from 300 to 850 U.S.P. XI units of vitamin A per day, which is equivalent to approximately four to ten U.S.P. XI units per gram of total feed. The top figures represent those estimated for good layers whose eggs are high in vitamin A content.

Septic Metritis?

A 1,000-pound saddle mare was well and eating hay at midnight. At five the next morning she had foaled a normal colt. The owner noticed that she was ailing and called me at once. At 5:30 I arrived to find a very sick mare. She was much depressed, holding her head low. The eyelids drooped slightly and the conjunctiva was red, heavily streaked with yellow. The nostrils were considerably distended. Pulse very full and fairly soft, but weak; 90 per minute. Temperature 104°F.; respiration shallow, with considerable flank movement and the flanks well tucked up. She showed a slight soreness in the foot when turned about in the box stall. The afterbirth had come with the colt, and there was practically no fluid remaining in the uterus. There were no symptoms of internal hemorrhage. I diagnosed the case as septic metritis, and gave an unfavorable prognosis.

The owner later reported that the mare died about four hours after I saw her. She had remained standing and appeared fairly comfortable until death, when she appeared to pass into a coma, leaned against the wall, slid down wall and manger, and was dead when she crumpled up on the floor.

Was my diagnosis wrong? What caused the death of this mare so soon after foaling? What treatment could have been employed?—*S. L. S.*

Comment.—Yes, we think your diagnosis was correct, and we do not know of anything that would have proved helpful in this case. We have had some very similar to this one, and we always felt there was a complication of founder, with probably a little eclampsia. The next case we have we are going to try 500cc calcium gluconate and dextrose, intravenously. If the condition has progressed too far, nothing can be done.—*E. T. B.*

■ I believe under the circumstances the veterinarian was justified in making a diagnosis of septic metritis, if only as a means of satisfying a client. Every practitioner encounters cases in which the diagnosis is obscure. There is something to be said for a veterinarian who thinks a case through carefully, makes a diagnosis and sticks to it until proved incorrect. However, just among friends let us examine for a moment this diagnosis of septic metritis.

First, septic metritis in a mare so rapid in its onset and destructive in its action as the case herein described probably does not occur in one out of 500 cases. Good horse players do not play 500-to-1 shots. They never win.

Second, it is difficult to conceive of a mare giving birth to a normal foal, passing the placenta normally and yet having a metritis capable of flaring up, becoming acute and septic, and causing the death of the mare in four hours—or nine hours. Considering these things I do not believe the mare died of septic metritis, and it is difficult for me to believe that peritonitis resulting from a rent in the uterus caused such a rapid death.

Well, then, what is the diagnosis? I am wondering if the mare actually was well at midnight. It has been my experience that one cannot depend entirely on the opinion of the groom or caretaker. Horses may eat hay in the early stages of an acute infectious disease and still have a temperature of 103° or 104°F.

The picture is one of acute septicemic disease, in which there is a rapid destruction of red cells by a toxin and a deposit of hemosiderin. The respiratory symptoms were far more intense than those that usually accompany high fever unless there is a pneumonia or acute encephalitis. She held her head low; what appeared to be a soreness of the foot may have been a soreness of the chest wall. She was more comfortable standing than lying down, and practically died on her feet. Death was due to a toxemia and suboxidation rather than to heart block. On the other hand, the eyelids drooped slightly, which could be very significant. The anxious expression so characteristic of acute congestion of the lungs was not present. The rapid death precluded the appearance of a reddish, yellow nasal discharge.

Again, what is the diagnosis? Your guess is as good as mine. At any rate, it is a very interesting case, and a post-mortem examination should give one a great deal of satisfaction.

Probably no treatment would have been effective. However, blood transfusions, glucose and physiological salt solution and chemotherapy intravenously appear to have been indicated.—*F. H.*

Volvulus of the Great Colon in a Filly

Upon answering a call to a farm four miles east of Scribner, Nebr., in the late afternoon of August 3, 1939, a two-year-old bay filly was found in the pasture tossing and rolling violently. After confining her an examination was made which revealed the following symptoms: pulse 85 beats per minute and rather weak, respirations 45 per minute and labored, temperature 106.4°F., conjunctiva slightly congested; and auscultation of the abdominal region revealed intestinal flatulence with slight peristalsis.

The following anamnesis was given by the farmer: the horse had drunk copiously at 2 p. m., and had eaten some freshly-cut alfalfa hay, after which she had returned to the pasture. At 5 p. m. she showed violent symptoms of acute indigestion, and the veterinarian was called.

The treatment consisted of the following carminatives and antiferments, given in No. 10 gelatin capsules: three drams of ammonium carbonate, one dram of chloroform, four drams of aromatic spirits of ammonia, and one dram of turpentine; then a one-ounce capsule of salicylic acid was given as an antipyretic. As a peristaltic intestinal stimulant 1cc of lentin was given subcutaneously; this was repeated in 15 minutes, and several minutes later defecation occurred, with resulting subsidence of the flatulence.

This treatment gave only temporary relief, however, and within two hours the animal began sweating, the mucous membranes became highly congested, the pulse rose to 90 beats per minute, and breathing once more became fast and labored. As muscular tremors made their appearance a tentative diagnosis of intestinal torsion was made. Death occurred at 9 p. m.

An autopsy substantiated the diagnosis. The great colon was found to be twisted 180° on itself at the junction of the right dorsal colon with the small colon, completely closing the lumen of the intestine. The area was swollen and nearly black from the congested venous blood. There was considerable fermenting alfalfa ingesta in the digestive tract. The animal was also heavily parasitized with strongyles, which probably accounted for her poor physical condition.

Comments.—A rectal examination would have been helpful in arriving at the proper diagnosis sooner. The treatment could have been improved by giving large quantities of normal saline solution both *per os* and *per rectum;* this plus rolling the animal back and forth on her back, might possibly have been successful in untwisting the intestine.

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Two Stages in Impaction

Left: The animal is suffering intermittent pain, exhibits some bloat, and rolls frequently. Later protrusion of the rectum, staggery gait, glassy eye and cold sweating occur, and in fatal cases the animal gradually succumbs to exhaustion (below).

Fibrosarcomata in a Jack

Fibrosarcoma, according to Feldman,[1] may be defined as a malignant tumor made up of connective tissue consisting of immature fibroblasts and their products. "Spindle-cell" sarcoma was the term formerly used for this condition. These neoplasms have both proliferative and infiltrative propensities.

Tumors of this sort may arise wherever connective tissue is present. Because of the wide distribution of such tissue they may develop in any part of the body; however, they favor certain locations, such as the skin and the subcutaneous tissues. They are common in occurrence. Fibrosarcomata are most commonly seen in the extremities; however, Kinsley[2] states that they are frequently seen in the eyelids and labial commissures of horses and mules, Feldman[1] found them on the head, while Kitt[3] observed them on the front of the breast. Apparently such factors as age, color, breed, sex or species have no influence on their occurrence.

Fibrosarcomata exhibit a centrifugal (infiltrative) type of growth. They may spread by metastasis, but do not often do so. They usually recur after removal. Kinsley states that if they do recur, they return quite rapidly and the growths are usually larger.

Grossly, these tumors are usually nodular or pedunculated, quite irregular in outline, and of firm consistency. If located on the surface of the body they usually ulcerate, emitting a fetid odor. The color is grey-white to flesh-colored. There is a tendency for secondary nodule formation.

Microscopically, fibrosarcomata sections are seen to be very cellular, the cells consisting of fibroblasts. The cells take on the character of anaplasia, as evidenced by the variation in the size and the shape of the nuclei and the increased number of the mitotic figures. They are also more vascular than normal.

[1] Feldman, W. H., 1932. Neoplasms of Domesticated Animals (W. B. Saunders Company), p. 88.
[2] Kinsley, A. T., 1917. Textbook of Veterinary Pathology (Alexander Eger, Chicago), p. 315.
[3] Kitt, T., Textbook on Comparative General Pathology (Chicago Medical Book Company).

The effect of these growths on the host varies much with their size, shape and position. If internal, they may produce various digestive, circulatory or respiratory disturbances, or because of lack of symptoms may not be noticed until a post-mortem examination is made. The external ones always disfigure the animal and are subject to constant traumatism. All surrounding tissue may be destroyed by infiltration. Since they are malignant, they are always dangerous.

Differential Diagnosis. — Fibrosarcomata may be mistaken for keloids or fibromata. Keloids are more vascular; infection is more common; there is evidence of injury. In fibromata, secondary nodules on the growth are absent. Microscopic examination is of great value in making a definite diagnosis.

Case Record.—January 30, 1940, a black, three-year-old jack, weighing approximately 600 pounds, was admitted to the veterinary clinic of Kansas State College with the history that the owner had noticed on the left hind leg a "blood wart," which had been growing steadily for several weeks. The animal appeared emaciated, and small for its age.

Symptoms. — Since the animal had never been handled nor halter broken, preliminary restraint was necessary. The temperature *per rectum* was 101.8°F., pulse 58, respirations 24. The mucous membranes were a normal pink with the respiratory, genito-urinary tracts and locomotion apparently normal. A fecal examination was positive for strongyle infestation. The growth, on the medial side of the left hind leg above the fetlock region, was seven inches in diameter and, as was ascertained later, weighed one and one-half pounds. The surface was necrotic and ulcerated, with a fetid odor. On palpation it was found to be mushroom-shaped, with the "stem," attached to underlying tissue, appearing to have broken through the skin, and the "cap" lying on the surface of the leg. In the immediate vicinity (medial surface) were found three other growths which, however, were smaller and still covered with skin. Continued examination disclosed two growths just above the point of the shoulder, one in the intermandibular space, and three at the tip of the left ear, all similar to the smaller ones on the medial surface of the hind leg.

Diagnosis.—From the indications of infiltration of the growth into the surrounding tissue and of metastasis to the other parts of

the body a malignant neoplasm was quite evident, and a tentative diagnosis of carcinoma was made. Microscopic examination of a section of the neoplasm later resulted in a positive diagnosis of fibrosarcoma.

Treatment.—Because of their accessibility, removal of the growths was decided upon as the best means of treatment. The operative area at the fetlock region was cleaned with soap and water and disinfected with mercuric chloride (1:500 solution). A local anesthetic (2% procaine hydrochloride) was infiltrated into the area. All of the growths on the left hind leg were removed surgically. A camphorphenol pack was then applied and a pressure bandage was used to control the profuse bleeding. This was repeated on the third and the fifth day after removal. On the fifth day the growths on the shoulder, the ear, and in the intermandibular space were removed with an electric cautery and left to heal as open wounds. The electric cautery was used in order to control the hemorrhage and to avoid the necessity of applying bandages to the parts. On the eighth day removal of the bandage from the hind leg disclosed that granulation tissue was filling in but slight hemorrhage still occurred. A pack of two parts boric acid and one part calcium hypochlorite compound was applied to the part with a pressure bandage.

A blood examination was made at this time, with the following results:

Red blood cells..5,800,000 per cubic millimeter
Hemoglobin.....9gm per 100cc
White blood cells..15,800 per cubic millimeter
Differential white blood cell count:

Eosinophiles			3%
Basophiles			1%
Myelocytes			0%
Juveniles			2%
Stab			19%
Segmenter			49%
Lymphocytes	Large	7%	21%
	Atypical	4%	
	Small	10%	
Monocytes			5%

The blood count disclosed a shift to the left, indicating a slight granulocytosis. This showed a normal response to the surgical removal of the growths, and perhaps to a slight infection.

On the tenth day, after the wound was cleaned with a dry cotton swab, the area was sprayed with pyoktanin blue solution and left to heal as an open wound. The patient was released from the hospital in apparently normal condition 14 days following the first operation.

WILLIAM ROSNER, K. S. C. '40.
Manhattan, Kans.

Handling Croup Presentations

There is nothing more discouraging to the veterinarian in the rural districts than to be called on an obstetric case some miles away, on a cold night or a rainy day, when he is well acquainted with the owner of the mare or cow, and knows when he is called that the owner and all of his neighbors have tried everything they can think of to effect delivery.

One method of delivery in such cases which has given me good results where there is a croup presentation is as follows:

After examining the patient, finding a very dry fetus, I insert a very sharp obstetric hook knife into the rectum of the fetus and divide the pelvis, then turning the hook I separate each ilium from the lumber vertebra. Then, with a blunt obstetric hook, I extract the bones of the pelvis, tearing the ligamentum teres and other ligaments of the coxofemoral joint. By looping the obstetric chain around the shaft, I withdraw each femur and even the tibiae in some cases. After these bones have been removed, usually the fetus can be pushed forward into the uterus sufficiently so that the hind legs may be straightened easily; if not, they may be pushed back in their own position and come away alongside the fetus. An obstetric chain is then passed around the loins and the fetus well lubricated. After this delivery is usually effected without difficulty.

Perhaps some comment on the anesthesia in such cases is in order. Anesthesia of course is required, both for humane reasons and to facilitate the operation, but a moderate amount only is necessary. If epidural anesthesia is employed, and that is preferable, it should not be carried to the point where it will inhibit involution of the exhausted uterus after the calf is delivered or serious post-partum hemorrhage may result. With the hind quarters raised a foot or so off the ground with a block and tackle, expulsive efforts will not materially interfere with manipulation of the fetus even though anesthesia be only moderate.

College Grove, Tenn. C. A. DEAN.

Anaplasmosis-Like Disease of Swine

By ROGER SPENCER, Manhattan, Kansas
Kansas State College, Class of 1940

AN anaplasmosis-like disease of swine has been reported several times during the last 10 years. The first such report was from Kinsley[1] in 1932, who found icterus, anemia, a tumefied, dark-colored spleen and an engorged light-colored liver together with a protozoan-like body in the erythrocytes of pigs dying in Illinois. Doyle,[2] from Indiana described an ictero-anemia in swine a few months later. The symptoms and lesions in Doyle's cases were given as those of bovine anaplasmosis. He also found dark bodies in the erythrocytes which he thought were either Anaplasma or Rickettsia. Kinsley and Ray[3] reported this disease in Illinois, Iowa, South Dakota, and Missouri. They said good results had been reported from the use of 10 to 15-grain doses of sodium cacodylate or from Fowler's solution in therapeutic doses. Sugimento[4] described a new species of Anaplasma called *A. tatwanensis* found in swine in Taiwan, Formosa. Dicke[5] reported the disease from several herds in an area in Kansas. Quin[6] noticed the clinical entity in pigs with characteristic lesions of icterus, enlarged spleen, and a yellow, mottled liver.[7] From these observations the condition appears to be an acute disease of young pigs consisting of an ictero-anemia with hepatic degeneration and splenic enlargement, probably caused by the Anaplasma or Rickettsia bodies found in the erythrocytes.

Etiology.—The etiology of the disease has not been definitely determined. The bodies seen in the erythrocytes may be organisms having no connection with the disease, caryolytic remnants resembling Howell-Jolly or Cabot's ring bodies, chromatin particles, degeneration products of erythrocytes, or artifacts.

The mode of transmission is unknown, but the low morbidity in a herd and the occurrence of the disease in the summer season only suggests some limited carrying agent, possibly a blood sucking insect. The pig louse, *Hematopinus suis*, has been suggested as a possible transmitter of the disease. Mechanical transference by hypodermic needles in hog cholera vaccination is another possibility.

Young animals weighing from 40 to 150 pounds are affected. The feed and environment probably have nothing to do with the disease.

Gross Lesions.—The anatomical changes are very characteristic. The carcass is pale with more or less icterus. The liver is yellowish, mottled, and of hard consistency, with the gall bladder highly distended with bile. The spleen is enlarged, only slightly more friable than normal, and has a normal to yellowish color. The intestine is usually empty, and has a quantity of saffron bile in the lumen, staining the mucosa yellow in the duodenal region. The lymph glands are swollen and edematous and there is a yellowish transudate in the pleural and peritoneal cavities.

Symptoms.—Herds in which the disease is found sometimes have a history of some obscure trouble in the years past. The affected pigs may be either immune or non-immune to hog cholera, but often come down with this disease during the reaction period following the serum-virus treatment.

The first change noted by the owners is weakness and lack of appetite. The pigs have a pale yellowish mucous membrane, and a temperature of 104° to 106° F. with rapid respiration and heart beat. Careful observation discloses a yellowish tinge in the white areas of the skin of many lively

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[1] Kinsley, A. T., 1932. Protozoan-like body in the blood of swine. *Vet. Med.* 27:5, p. 196.
[2] Doyle, L. P., 1932. A Rickettsia-like or Anaplasmosis-like disease of swine. *J. A. V. M. A.* 81:5, pp. 668-671.
[3] Kinsley, A. T., and J. D. Ray, 1934. Anaplasmosis-like disease in swine. *J. A. V. M. A.*, 84:3, p. 391.
[4] Sugimoto, M., Anaplasmosis-like disease in Formosan swine. *J. Soc. Trop. Agric.* 7, pp. 240-244. Abst. in *Exp. Sta. Rec.*, Vol. 75, p. 544.
[5] Dicke, W. E., 1934. Anaplasmosis-like disease in swine. *Vet. Med.*, 29:7, p. 288.
[6] Quin, A. H., Jr., 1938. A herd condition of swine characterized by icterus and anemia. *Journal Am. Vet. Med. Assoc.*, 93:5, pp. 327-328.
[7] See also: *Vet. Med.* 33:12, p. 582; 34:1, p. 56; 34:2, p. 104.

pigs. There is a marked anemia, as low as 30% on the Tallquist scale, and an increase of the neutrophilic polymorphonuclear leucocytes.

Death may occur in a day after the symptoms are noticed or the course may be prolonged to seven days. The animal becomes exhausted and dies in convulsions.

The clinical diagnosis of this condition depends on finding the characteristic lesions on autopsy. The mortality is high among animals showing clinical symptoms, but slightly-affected pigs may be overlooked.

Treatment.—Sodium cacodylate in 10 to 15-grain doses in a 10% solution intramuscularly or therapeutic doses of Fowler's solution have been reported as giving good results in the field. They should be accompanied and followed by dietary treatment of the anemia and weakness.

Case Records

In the summer of 1930 two herds of swine with this condition were observed in the vicinity of Slayton, Minnesota, in the practice of the late Dr. P. H. Radford.

Herd 1.—This was a group of 80 spring shotes, 10 weeks of age, presented for immunization against cholera. Post-vaccination losses had occurred in the past years and the surroundings were insanitary. The pigs were fed barley, oil meal and rye pasture. Since the herd was unthrifty and two animals were definitely sick, the hog cholera vaccination was postponed. Two weeks later the pigs were given 2cc of hog cholera virus and an average of 36cc of anti-hog cholera serum. For a month thereafter a few animals sickened from time to time until a total of eight animals were affected to a marked degree and six died.

A post-mortem examination was made on one of the pigs prior to vaccination and on two of those that sickened after vaccination. The carcasses were pale and icterus was present, being especially noticeable in the white abdominal fat. The liver was mottled brownish-yellow, of firm consistency, and about normal in size. The spleen was large and dark brownish red, and had a softer-than-normal consistency. The lymph glands were swollen, light yellowish-pink, and the cut surface exuded serous fluid. A mild enteritis was observed in one pig, and all three had a bright yellowish material in the duodenal portion of the small intestine. This bile had stained the mucosa and some of it through antiperistalsis had stained the pyloric region of the stomach.

Since autopsy of three animals showed an enlarged spleen, pigeons were inoculated with a splenic emulsion of one of the pigs and four sick animals were given 18cc each of swine erysipelas anti-serum. The pigeons continued to live and no beneficial effect was observed from the serum.

A better ration was recommended and after six weeks of slow gains the herd gradually became more healthy.

Herd 2.—This group of 120 spring shotes weighed about 90 pounds. They were apparently healthy when vaccinated, but 10 days later six pigs sickened. In the next few days five more cases appeared, and many other animals in the herd were unthrifty. Eight animals died and autopsies of several of these showed an ictero-anemia and hepatitis with edematous lymph glands and a yellowish fluid in the pleural and peritoneal cavities. A few petechial hemorrhages of the cortex of the kidney and the mucosal surface of the bladder were considered to be due to the hog cholera vaccination 12 days previously.

The sick pigs were isolated and given 20cc of anti-hog cholera serum. The ration of barley and pasture was changed to oats, corn, barley and tankage. In a few weeks improvement was observed.

Microscopic Lesions.—Sections of the spleen and of the liver were taken from a pig in herd 1, stained with hematoxylin-eosin and examined with the microscope. The histological lesions in the spleen consisted of a hyperplasia of the reticuloendothelial cells, hemosiderosis and congestion. The liver lobules showed a marked central atrophy in which the normal liver cells were replaced by degenerated and broken down erythrocytes, pigment granules, and various phagocytes which had ingested the débris. In addition the liver showed hemosiderosis, an infiltration of the interlobular spaces with lymphocytes and macrophages, and albuminous degeneration of the hepatic cells.

These changes would indicate a subacute or chronic condition. The liver changes are similar to those observed in equine infectious anemia, which is usually a chronic disease. Though the clinical course is acute and the symptoms are those of a rapidly progressive anemia, this apparent chronicity of lesions is most likely due to a long-standing destruction of red blood cells that becomes evident only when severe or when aggravated by another disease.

Reduction of Losses Incident to Farrowing

By A. T. KINSLEY, Kansas City, Missouri

FARROWING, as a normal physiological process, is an event of little consequence in the wild hog. The domestication and improving of type of swine to the present standard has resulted in a marked change not only in the habits but also in such physiological processes as parturition. Intensive breeding and cramped quarters have favored the development of infective diseases.

Farrowing difficulties are relatively common in select sows of any breed. Most veterinarians in the corn belt have made a special study of the care of the sow and pigs, and with the cooperation of the breeder the losses of pigs and sows incident to farrowing can be reduced to a minimum. The following factors have been found of value in preventing accidents and losses during farrowing.

Date of Breeding

The date of breeding is the only true index of the time of farrowing and should be recorded by the breeder so that he may know when the sow should be placed in the farrowing pen.

Feeding of the Sow

The feeding of breeding sows is far more important than any other factor except the provision of proper surroundings. Pregnant sows should be given a good maintenance ration, but should not be fattened. Excessive fat is a common cause of difficult farrowing, and is occasionally responsible for the loss of the sow. About 10 days before farrowing the fat-producing foods should be diminished or entirely eliminated and concentrated nitrogenous foods given, but in relatively small quantities. The entire course of feeding during pregnancy should include ample mineral substances and especially phosphates to supply the necessary bone ingredients for the developing pigs and to support the skeleton of the sow. In those sections of the country where hairless pigs have been produced, iodine salts should be incorporated in the feed of the sow during pregnancy.

The Farrowing Pen

The sow should be placed in special quarters for farrowing about one week prior to that event. The individual farrowing house or special pen in a hog house is the ideal place for farrowing. Proper arrangements must be made to overcome extremes of weather such as too low or too high temperature or excessive moisture. Ventilation should be provided to insure fresh air, dryness, and absence of draughts. Provision should be made for an abundance of sunshine, as it is an important factor to the young animals. Unless the foregoing provisions for farrowing quarters are available, the breeder can hope to produce but a fraction of a pig crop.

Unless the "A" shaped farrowing house is used, a pig rail should be provided to prevent the sow from killing the pigs.

Cannibalism

An occasional sow is a pig eater. Such a sow is usually insufficiently fed, particularly in nitrogenous feeds. A small ration of tankage during the gestation period has been recommended to prevent pig eating; but once a sow has the habit of pig eating, it may not be possible to prevent it in the future.

Delivery

In some young sows and in a few older brood sows, the genital organs are abnormal or there may be a malformed pelvis which causes difficult passage or expulsion of the pig. In some instances, it is impossible for the pigs to be expelled from the uterus. It is not advisable to assist in delivery of pigs until it is positive that the sow is unable to make her own delivery. The inability of the sow to deliver is difficult to determine, but generally speaking, when contractions become less forcible, assistance should be given. When it is necessary to give assistance, the sow should be placed on a clean bed away from dust. If possible the hand alone should be used. A small boy is frequently the best obstetrician

for the delivery of pigs, if he has been properly instructed how to pass the hand so that the genital organs are not injured. Forceps of wire may be used. In some intensive hog-breeding sections, veterinarians provide a special room at their place of business for taking care of difficult delivery cases in sows. In these locations the breeder finding a sow that is having dificulty in delivery, loads her into an automobile and takes her to the veterinarian, where equipment is available to give the best service possible. The breeders in the communities where this method has been given a trial believe it to be the best solution of the problem.

Examination of Pigs

Some pigs are apparently dead when farrowed, but when they are examined, their heart is found to be beating. In these cases artificial respiration should be resorted to, for by this means the pig can usually be saved. All pigs should be carefully examined to see that they have all of the natural openings—anus, vulva, nostrils, etc. Many pigs have no anus at birth, and unless one is provided by surgical operation in a few hours time, the pig is certain to die. One such pig, observed by the writer, that was operated upon in this manner, was sold at six months of age for $1,000, so the operation is well worth while.

The after-birth should be burned or buried. By no means should the sow be permitted to eat it, for that may cause her to become a pig eater.

Metritis

Metritis in sows may be classified as catarrhal, purulent, and septic. This condition is manifested by congestion and tumefaction of the external genitals and the discharge of variable quantities of fluid, the character of which depends upon the type of inflammation.

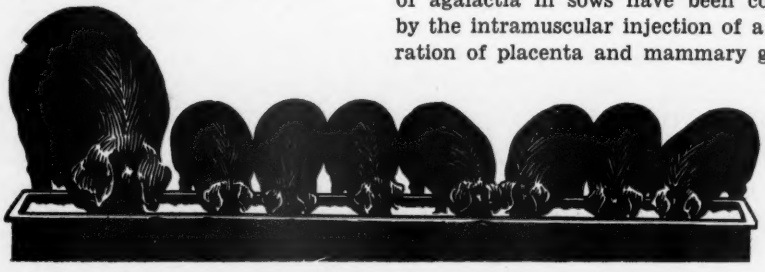
Treatment of metritis in sows has not been entirely satisfactory. Some say the most successful treatment consists of uterine irrigation, but it is difficult to apply this treatment because of the small size of the external genitals. The vagina should be dilated by means of a speculum, after which a small tube, such as a horse catheter, is passed into the uterus and a dilute solution of tincture of iodine carefully injected. After the iodine solution has been syphoned out the injection of from two to four ounces of alcohol has given good results. Uterine douches should be repeated if necessary. Quinine bisulphate in 20-grain doses, injected intramuscularly or into the axillary space and repeated every 12 to 24 hours, has been reported to be of value, particularly in cases of septic metritis.

Agalactia

The cause of agalactia in sows has not been definitely determined. In some cases improper feed appears to be a contributing factor, but it is possible that some disturbance of internal secretions is the principal cause.

True agalactia is nonfebrile. The mammary glands are flabby, and little, if any, milk can be expressed from the teats. The pigs continuously attempt to nurse. They soon become gaunt and have a starved appearance.

Some of these cases can be successfully treated by providing a barley mash that has fermented for a few hours. Malt, maltine or similar products may be substituted for the barley mash. Injections of gland products is also recommended. Some cases of agalactia in sows have been corrected by the intramuscular injection of a preparation of placenta and mammary gland.



Effect of Commercial Phenothiazine On a Heavily-Parasitized Ram

By ROBERT T. HABERMANN and WM. HAWARD HUNT,
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SINCE the introduction of phenothiazine as an anthelmintic by Harwood, Jerstad, and Swanson,[1] considerable work has been done in this country and abroad to show that this drug is very effective for the removal of roundworms from sheep. However, no tests designed to demonstrate general improvement in the condition of these host animals following the expulsion of nematodes have been reported heretofore.

On October 26, 1939, it was noted that a ram which was running with a flock of ewes maintained at the Beltsville Research Center, Beltsville, Md., was unable to keep up with the flock. This animal weighed 73 pounds and showed a large edematous swelling (Fig. 1) under the jaw, pale skin, and a dejected, tucked-up appearance when placed on his feet. A hematocrit reading of 10 demonstrated that the animal was anemic.

The feces from this ram were examined for nematode eggs by Dr. Doys A. Shorb of the Zoological Division, who found many eggs of Hæmonchus, and a considerable number of eggs of Bunostomum, Oesophagostomum, Trichostrongylus, and Strongyloides. Accordingly, a diagnosis of generalized gastrointestinal parasitism was made.

As the ram was born at the Beltsville Research Center on February 2, 1938, a fairly complete record of his past history is avail-

[1] Harwood, Paul D., Arthur C. Jerstad, and Leonard E. Swanson, 1938. The efficacy of phenothiazine for the removal of ascarids and nodular worms from swine. *Jour. Parasitol.*, 24:6 suppl., pp. 16-17.

Figure 1 (left). Photograph of a ram taken October 26, 1939. The edematous swelling of the gular region is frequently called "poverty jaw," or "bottle neck." The ram was suffering from general parasitism.
Figure 2 (right). Photograph of the same ram taken on November 14, 1939; 19 days after treatment with phenothiazine. The poverty jaw has disappeared.

able. During the first year the ram was used in various experiments, involving infection with hookworms, and was kept under conditions designed to prevent any extraneous helminth infection. It is possible that the hookworm infestation retarded his growth somewhat. Early in the summer of 1939, this ram was released from the hookworm experiments and placed on the pasture with the breeding flock of experimental sheep. On August 25, 1939, he was treated routinely with three ounces of a 1% solution of copper sulphate, but in spite of this treatment he developed symptoms of severe parasitism as described above.

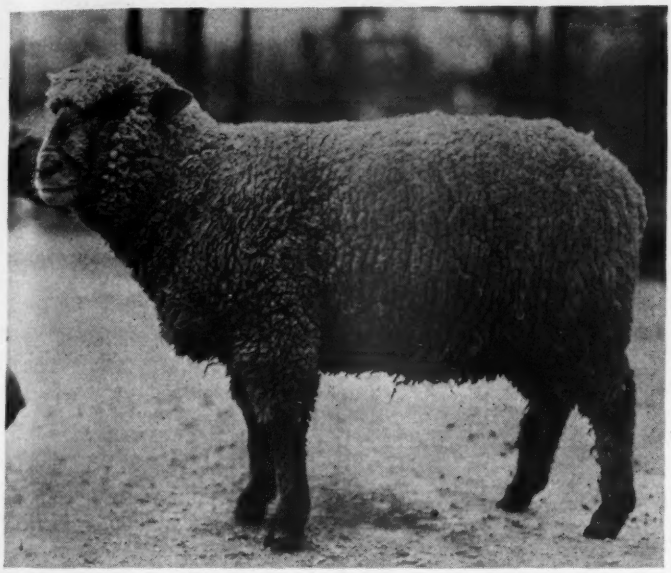


Figure 3. Photograph of the same ram taken January 19, 1940. In less than three months following the administration of one dose of phenothiazine this sheep gained 51 pounds.

The ram was confined in a pen having a concrete floor, and treated with 25 grams of commercial phenothiazine[2] administered in capsules. During the first 10 days following treatment the feces were examined daily for worms. The animal was fed a diet which consisted mostly of oats and bran, and later alfalfa hay was added.

The technique of examining the feces for worms was the same as that described by Habermann and Harwood[3]. A total of 39 Oesophagostomum, 36 Bunostomum, 2 Trichuris, 1 unidentified large worm, 2,189 Trichostrongylus, 21 Cooperia, and 54 unidentified small worms were obtained from the feces. The stomach worm, *Hæmonchus contortus,* was not recovered in the feces, but it is assumed that the worms of this species were removed from the stomach and digested in the intestines, since no eggs of this parasite were found on fecal examination made on December 12 and 13, 1939. However, it was noted at this time that a few eggs of Cooperia, Trichostrongylus, and Strongyloides were present.

The sheep made a remarkable recovery as shown by comparison of the photographs presented in Figs. 1 and 2. In Fig. 2, which was taken on November 14, 1939, 19 days after treatment, the "bottle neck," or "poverty jaw" has disappeared. At this time the hematocrit reading was 25; the weight, 115 pounds. On January 19, 1940, the hematocrit reading was 31; the weight, 124 pounds, or a gain of 51 pounds in less than three

[2] This refers to non-conditioned phenothiazine. Commercial phenothiazine for insecticide use is conditioned by adding a wetting agent to facilitate its use as a spray. This conditioned phenothiazine is unsuitable for anthelmintic use on account of its bulk.

[3] Habermann, Robert T., and Paul D. Harwood, 1940. The efficacy of recrystallized phenothiazine for the removal of nematodes from the gastrointestinal tract of sheep. *Vet. Med.*, 35:1, pp. 24-29.

months, when he was released from this experiment (see Fig. 3).

Summary

1. Twenty-five grams of commercial phenothiazine was very effective in removing the nematodes from the gastrointestinal tract of a sick, heavily parasitized ram.

2. The percentage of red blood cells and the weight of the ram increased rapidly after the nematodes were removed.

3. Photographs taken before and after treatment show the marked improvement in the ram's general condition.

* * * *

Allium Sativum in Arthritis Therapy

The frequent assertion that arthritic symptoms cannot be induced artificially because of the diversity of causative agents and individual susceptibility is a fallacy. It is equally erroneous to maintain that arthritis is a clearly defined disease of specific origin, when, in reality, it is merely a symptom of one or more organic dysfunctions.

A syndrome identical with that appearing in arthritis was accidentally produced in dogs by the introduction into the diet of vegetables containing noxious acids: in one particular case, for instance, boiled turnip greens, now strongly recommended for their vitamin content. This vegetable, like several other root tops, contains a slight amount of oxalic acid. While young and mature animals are able to throw off such toxins without difficulty, they represent a serious menace for the aged.

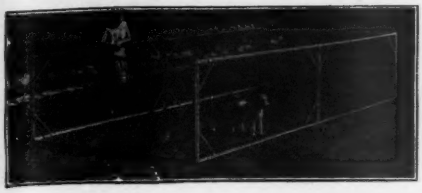
Old dogs show little or no resistance to the effect of toxins because of the diminished activity of their kidneys. All foodstuffs leave, after digestion, certain toxins in the body which must be eliminated promptly. If this elimination is retarded or is not accomplished, distressing symptoms are the result; in severe cases, and quite frequently, high blood-pressure, skin eruptions and stiffness of the joints have been observed. When the kidney is in first class working condition, as is the case in young and normal animals, toxins are promptly excreted.

It is by aiding the kidney in its function that one may hope to assist the arthritic patient, since his case is simply an insufficiency of the kidney. The latter condition, however, may have its origin in a cardiac disturbance. It must be remembered that the kidney is an organ which, more than any other, requires a steady and abundant supply of blood if it is to perform its duty properly; if this supply is lacking either in volume or in continuity, adequate function is impossible. The fad of recent years to eliminate innumerable valuable foods from the diet of the patient in the hope of aiding the arthritis victim, is adding insult to injury, since the reduced diet aggravates the condition and impairs the quality and quantity of the blood.

In the case of cardiac dysfunction, the heart is unable to supply the kidney with the necessary flow of blood to assure its proper working condition, so that it is, in the end, the kidney which is most heavily taxed, if unaided. Thus, aiding the heart indirectly helps the kidney insufficiency; medication helps directly without resorting to the experimental elimination of necessary foodstuffs, so important in maintaining the normal balance of body function.

It appears that, contrary to general opinion, arthritis is a symptom of kidney insufficiency, resulting in a toxic condition in the body—mild symptoms of poisoning which, in an aggravated degree, cause complete paralysis.

In recent years the value of *Allium sativum* (common garlic) in obstinate cases of arthritis with accompanying high blood pressure has been recognized. The bulb of this plant contains an oil identical with allyl sulphide, $(C_3H_5)_2S$, which promotes the activity of the excretory organs (Hofmann and Cahours, *Jour. of the Chem. Soc.* X, p. 320). It was consumed in great quantities by the ancient Greeks and Romans. Pliny (N.H. XX, 23.) extolled its properties in healing numerous ailments, and in modern times garlic has been prescribed in the form of an extract for the cure of pulmonary tuberculosis. Cullen (Mat. Med. ii. p. 174, 1789) found that cases of dropsy were cured with garlic alone. *Allium sati-*



vum preparations in tablet form are now in use for the treatment of arthritis, but the fresh plant proves to be vastly superior in effect. Boschetti (*Giorn. della R. Soc. Vet. Ital.* 1900) recommends garlic in cases of diarrhea in horses, and Rovatti (*ibid.*, 1905), claims excellent results in dysentery of calves. Roos (*Muench. Med. Wchnschr.* 1925, No. 39) draws attention to the soothing effect of *Allium sativum* upon the intestinal tract without causing constipation. Symptoms accompanying old age in animals are alleviated. (This statement has been corroborated by my own experiments.) Old dogs afflicted with so-called incurable arthritis, with joints so stiff and painful that they were unable to rise or walk, have been permanently cured with this simple remedy (one tooth of fresh garlic, cut up and mixed with the ordinary food once a day). Improvement was evident after a few days, and complete recovery after a few weeks. There has been no relapse during the six or seven years following administration of the plant.

The sulphurous oil present in *Allium sativum* accelerates the elimination of residual toxins accumulated in the organism, and promotes the activity of the excretory organs. It has a general stimulative and stomachic effect. If a sufficient amount of *Allium sativum* were taken in the daily diet, arthritis would be non-existent. The references cited above prove that this plant is an ancient remedy, and not a new and untested fad. Like so many useful remedies, it has fallen into disuse and has become almost forgotten. Its unquestionable therapeutic value, the multiplicity of its uses, easy administration and low cost should put it back where it belongs: among the most indispensable pharmaceutical plants grown.

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Inguinal Hernia of the Uterus in a Bitch

A black and tan female terrier, two years of age, weighing about 14 pounds, was brought to me, with a large swelling on the right side in the inguinal region.

The history was that this bitch had been bred for the first time about five weeks previously, and about three weeks later this swelling had commenced to develop.

On examination, the enlargement was fluctuating, irreduceable and contained three masses of about twice the size of a golf ball. There were firm adhesions in the inguinal region and the enlargement was obviously not an intestinal hernia. No definite diagnosis was made, but a carcinoma that was undergoing liquefaction was suspected.

An exploratory operation revealed the peritoneum thick, greenish black and firmly adhered to the tissue underneath. When the peritoneum was peeled off by blunt dissection, the uterus was easily recognized. The solid masses that could be palpated were removed and proved to be three puppies, all dead, and of about half the size that a fetus should be at five weeks. They were surrounded by much liquid. A fourth puppy of normal size was pulled out of the abdominal cavity through the inguinal canal, the right ovary coming with it. This was removed and by enlarging the inguinal ring, the left horn of the uterus was secured and pulled through the same opening. With some difficulty the left ovary was reached and twisted off. The uterus was amputated close to the os and the stump turned in, sutured with a Czerny-Lembert suture, and returned to the abdominal cavity.

Three sutures of No. 1 catgut were placed in the ring. The skin was sutured firmly to the subadjacent tissue and the incision closed with linen sutures. There was a considerable collection of serum which drained for three or four days and the animal was sent home well on the road to recovery after spending six days in the hospital.

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Vaccination of Dogs with a Modified Distemper Virus*

By R. G. GREEN, W. E. CARLSON, and F. S. SWALE
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MODIFICATION of the distemper virus by serial passage through ferrets to produce a state of low virulence for dogs has been described by Green.[1] Extensive use of this virus for the immunization of foxes has been accomplished by Green and Carlson and their results are being published elsewhere. Preliminary vaccination tests by Green and Swale, using an undehydrated, frozen, modified distemper virus on 136 dogs, demonstrated the feasibility of utilizing a virus modified by passage through ferrets for the immunization of dogs against canine distemper. Additional field trials of this vaccine prepared from the virus modified by Green have shown further the possibility of utilizing a single dose of vaccine in the immunization of dogs, and these results form the substance of this report.

■ The vaccine used in these tests was prepared from the 53rd passage through ferrets of a dog distemper virus. It was utilized in a dried form. In this form the vaccine maintains its viability for at least three months, and frequent tests by ferret inoculation of representative samples returned by the group of veterinarians who conducted the field trials proved the maintenance of potency.

With the cooperation of this group of veterinarians, 419 dogs, ranging in age from 12 weeks to five years, have received this vaccine in field trial vaccination. The dosage used in all cases was 2cc of 0.125%, administered subcutaneously. Detailed written reports on these 419 dogs have been filled out and submitted by the practitioners. Approximately 200 additional dogs are known to have been vaccinated by this group of veterinarians during the past 30 days; written reports have not yet been received on these, but its is known that satisfactory results are being obtained in this group of dogs.

■ The results obtained by this group of veterinarians in field trials of this vaccine have been uniformly good. Of the 419 reported vaccinations, four deaths were reported to have occurred. At the time of inoculation, no contraindications were observed by the veterinarians in these four animals. Death may have resulted from a combination of vaccination with unknown complications. These four deaths represent less than 1% of all the normal dogs vaccinated. It is believed that this small percentage of loss during initial field trials can be further reduced, if not entirely eliminated, as the practitioner becomes more familiar with the vaccine and experienced in the use of this new product.

A number of the 419 dogs referred to in this report have been tested for immunity to distemper following vaccination by the subsequent injection of commercial live distemper virus and also by street and kennel exposure to natural cases of distemper.

One such test for immunity to distemper was conducted on eight pups, 78 days after vaccination. They were given a subcutaneous injection of 0.5cc of 0.1% commercial live distemper virus. Temperatures of these pups were taken daily for 18 days following the test inoculation, but no rise in temperature was produced by this injection of live virus. A control ferret injected with the same commercial virus developed distemper after the usual period of incubation.

Several veterinarians reported that following vaccination many of these dogs were placed in distemper wards in small

[1] *J.A.V.M.A.* 95:751, Oct. 1939, pp. 465-466; 469-470.

* Presented at the 16th Annual Conference for Graduate Veterinarians, Alabama Polytechnic Institute, Auburn, Ala., March 20-22, 1940.

animal hospitals, some in the same cages with dogs having natural cases of distemper, with the result that all vaccinated dogs remained well.

■ To obtain the best results, as is true of any form of immunization, the dog must be in good physical condition at the time of vaccination. The usual contraindications should be observed. Dogs manifesting symptoms of rickets, avitaminosis, malnutrition, internal parasites, streptococcic sore throat, convulsions, etc., are poor risks for any potent vaccination. We believe malnutrition and dietary deficiencies to be especially important contraindications to be observed. A thorough examination by the veterinarian to determine whether any of these conditions exist when the dog is presented for immunization will prevent undesirable vaccination reactions. Dogs should receive a good sustaining diet prior to and following vaccination, and should be kept in warm, dry, comfortable quarters. They should not be permitted to become fatigued for a period of at least 30 days following inoculation. This would apply particularly to bird dogs, retrievers and hounds.

Because an active canine distemper serum will nullify, partially or entirely, the effects of an injection of modified distemper virus vaccine, no dog should be vaccinated until it is determined whether a previous dose of anti-canine distemper serum has been given, and if so, on what date it was administered. Many veterinarians protect puppies with a passive immunity by the injection of anti-canine distemper serum during the early weeks of life. If this has been done, vaccination with modified distemper virus vaccine should not be instituted until at least 16 days after the last dose of serum was given.

A mild reaction is produced in normal dogs by the injection of this vaccine. The reaction is characterized by a slight conjunctivitis, listlessness, some looseness of the bowel, and a slight or partial loss of appetite, between the 5th and 7th days following vaccination. The temperature of the animal usually shows a rise of one to two degrees. After about two days, the dog returns to normal. Many show a single reaction, while others have shown a slight secondary reaction between the 11th and 14th days. The second reaction, if it does occur, is usually of 24 hours' duration only. In certain cases, it is desirable to check an objectionable symptom. For example, a mild diarrhea in house dogs, which sometimes occurs, may be controlled by the injection of a small dose of any potent anti-canine distemper serum.

■ Two rather important observations were made during the field trial vaccinations. Among the 419 written reports submitted on vaccinations of normal dogs by this group of veterinarians, many revealed that they had performed spaying operations, ear trimming, tail amputations, etc., and immediately preceding or following the operation, had administered modified distemper virus vaccine without marked shock or severe reaction. The opinion was expressed by several of the group of veterinarians who conducted the field trial vaccinations that the virus produced a more marked or severe reaction in animals suffering from malnutrition or marked dietary deficiencies than in those provided a well balanced diet. Green and Carlson in their work with modified distemper virus in foxes were of a similar opinion.

As a result of the latter observation, a group of 25 dogs was purchased for the following experiment. These dogs were an entirely different group from the 419 normal dogs referred to in the foregoing. They were purchased from a sales kennel handling low-priced dogs. They had been fed a very poor diet. Following vaccination they

The vaccination here described is a new principle in immunology. Smallpox vaccination in man and the vaccination of chickens with pigeon pox virus are very similar, but in both cases the viruses used were differentiated naturally from the viruses against which protection is sought. In this case the modification of the pathogen was intentionally produced.

were kept in the same quarters and received the same diet. This kennel was known to have had numerous cases of distemper each year. These dogs were emaciated and infested with internal parasites. Conditions were not sanitary, shelters were of make-shift type and did not provide comfort or adequate protection from the weather. Four deaths occurred on the 15th and 16th days after the vaccination under such undesirable conditions.

This experiment supports the opinion of Green and Carlson, as well as of the group of veterinarians referred to in this paper: first, that a more severe reaction is to be expected from modified virus vaccinations of abnormal dogs where malnutrition or other marked dietary deficiencies exist; second, that modified distemper virus vaccine may be given to a normal susceptible dog that is receiving a well-balanced maintenance diet immediately preceding or following limited surgical operations without producing severe reaction or shock.

■ The immunity produced by canine-distemper vaccine is an active immunity stimulated by an actual, but harmless, generalized infection. Evidence at the present time indicates that the high degree of immunity obtained will persist for several years, during which time the aging of the dog and its successive contacts with virulent distemper while immune, practically eliminate any further possibility of contracting a true infection of the disease.

Because of the long artificial passage of canine distemper virus through ferrets, and its decrease in virulence for dogs, the vaccine made of it is not contagious. This has been determined by actual tests and extensive use. In large-scale injections of the vaccine it has not spread from injected animals to susceptible animals.

In our work with modified distemper virus over a period of years, its stability and reduction in virulence through animal passage have been dependable characters. From our results thus far, general vaccination of dogs against distemper by the judicious use of a single dose of modified distemper virus seems feasible.

Distemper and Encephalitis

1. *Canine Distemper* is usually a virus disease of the dog, but the fox, raccoon, mink, and ferret are highly susceptible and suffer epizoötics both in the wild and in captivity. The disease in all animals is characterized by inclusion bodies, usually cytoplasmic but occasionally nuclear, in the epithelium of the respiratory and intestinal tracts, and in the linings of the bile ducts, kidney pelvis, and urinary bladder.

2. *Epizoötic Fox Encephalitis* is a virus disease usually of the red or silver fox, although dogs and wolves are readily susceptible. Clinically the disease is strikingly similar to uncomplicated canine distemper except that the duration of symptoms rarely exceeds five days. It is characterized by inclusion bodies, always nuclear, in the endothelium of the smaller blood vessels and by similar inclusions in the hepatic cells of the liver cords.

3. *Ferret Distemper* is a virus disease due to a modification of the canine distemper or Carré's disease. It is characterized by the same inclusion bodies as those of canine distemper, since it is the same virus. The ferret virus is non-pathogenic for foxes and dogs but highly fatal to minks, sometimes destroying practically all the animals on a mink ranch. The virus modified in ferrets has been termed canine distemperoid virus.

Differentiation

1. *Canine Distemper* affects dogs, foxes, raccoons, ferrets, and minks. It is highly infectious, with a case mortality ordinarily varying from 25 to 100%. Inclusion bodies are found mainly in the cytoplasm of epithelial cells of the respiratory tract, urinary bladder, bile duct, and pelvis of the kidney.

2. *Epizoötic Fox Encephalitis* affects foxes and dogs, but not ferrets nor minks. Inclusion bodies are exclusively nuclear and are found principally in the endothelial cells of the blood capillaries and in the hepatic cells.

3. *Ferret Distemper* is highly infectious and fatal for ferrets and minks, but exposed dogs and foxes are not visibly affected, if the virus is highly modified; however, those that are infected, although non-clinically, are rendered immune to canine distemper.

Gastritis in the Dog*

VOMITING is the most consistent symptom of gastric disturbance in the dog. However, it is not infallible as an indicator of ailments of the stomach, since it is present frequently when there is nothing wrong with this organ. Perhaps it expresses it to say that vomition is *prima facie* evidence of gastric disturbance, but is not evidence *per se* that there is any ailment of the stomach.

Anatomically and physiologically the dog is well equipped for ejection of the stomach contents *via* the mouth. It is common to say that the vomiting center in the brain is highly developed and the act of vomition is under control. That is true only on the positive side. Vomition in the dog is produced readily by stimulation of the vomiting center and the animal can perform the act at will with ease and facility. On the contrary, inhibiting the act when it is useless or harmful is often difficult, and the animal itself is wholly unable to prevent an act that it may perform voluntarily without the slightest difficulty.

Vomiting in the dog when long continued is a serious matter. It may cause dehydration, exhaustion and death in the absence of any other mortal ailment. While always a symptom of some basic abnormality, on occasion it may in itself become the ailment of importance and dictate the treatment necessary to relieve the animal.

Materials in the blood that stimulate the vomiting center, which lies on the floor of the fourth ventricle, cause vomiting in the dog irrespective of the condition of the stomach. This, of course, is recognized by all in the case of morphine and apomorphine. It is not so generally known that a small amount of urea in blood will as certainly cause it; thus we find it a persistent and distressing symptom of acute and chronic kidney involvement. In autointoxication and intestinal obstruction, vomiting

may ensue in whole or in part due to substances in the blood that excite the vomiting center. In such cases treatment should be directed, of course, to the basic ailment, but it may be necessary to treat the vomiting or the animal may not live long enough to recover from the original ailment. Then there is the owner to satisfy, who may be greatly distressed by the frequent and exhausting attacks of retching that the animal is suffering.

Nerve impulses too may cause vomiting when there is not the slightest thing wrong with the stomach. Thus excitement, pain, shock, parasites in the external auditory canal, a bitter taste and even worry will cause dogs to vomit, often to the alarm and always to the annoyance of the owner. While vomiting from such causes seldom imperils the life of the animal, we are commonly called upon to treat it and since in not a few instances we cannot remove the cause we must treat the symptom.

Traumatism, particularly head injuries, is a frequent cause of vomiting, as is also inflammation of the brain. Sometimes

* Notes from an address by Dr. C. W. Bower, Topeka, Kans., at the 3rd Annual Meeting of the Mid-West Small Animal Association, Burlington, Ia., March 7, 1940.

vomiting occurs early and often in rabies. It is very prone to occur in surgical patients suffering from otitis. It is good practice to delay major surgical operations, unless they be emergencies, in dogs suffering from otitis until it can be cleared up. Otherwise the vomiting may be distressing and complicate convalescence from the operation.

For the relief of vomiting not due to an ailment of the gastric organ itself or to the nature of its contents and where the cause cannot be remedied promptly it is necessary to depress the vomiting center. For this purpose I find nothing else quite so satisfactory as chloretone. In many instances only light and infrequent doses are required; in others, as grave uremic poisoning, a more or less profound narcosis may be required. It is relatively safe and harmless and gives the animal rest and relief while the basic ailment is being attacked if it be amenable to treatment. It should be given in sufficient dosage to control the vomiting. Usually this will be accomplished by doses of from one grain in the smallest dogs to 15 grains for large dogs. However, if more is required, these doses should be increased.

In uremic poisoning possibly it is best to allow the animal to come out from under the influence of the chloretone occasionally and vomit, since in this condition considerable urea is eliminated in the vomitus and the animal's life may be prolonged in this way till renal function can be reëstablished. However, it is not necessary to accomplish this that the animal be allowed to retch continually, as it will without chloretone, and exhaust itself. The retching, exhaustion, and distress are in themselves obstacles to recovery.

Vomiting in dogs is sometimes seen from the lodging of food in a dilated place in the esophagus. In such cases, vomiting is even more likely than in the foregoing to be mistakenly thought to be of gastric origin. An examination of the vomitus, however, will reveal that it is only slightly acid, if at all, whereas dejecta from the stomach is strongly acid if it has remained in the organ any material length of time.

Mild Gastric Catarrh

A mild gastritis is the commonest digestive ailment of dogs, in fact the commonest of all ailments of house dogs. There are numerous causes of this ailment and it varies in severity from cases so mild we are scarcely justified in calling them inflammation and of evanescent duration, to cases of long standing in which there is a marked catarrhal exudate on the gastric mucosa.

Notwithstanding semi-wild dogs and even farm dogs will gorge themselves with impunity, vomiting in house dogs is frequently due to overfilling the stomach. The remedy is limiting the amount of food at a feeding and feeding oftener.

Digging up and gnawing buried bones, a perfectly natural performance for a dog, or eating tainted meat, likewise harmless for semi-wild and farm dogs, will often cause much vomiting in house dogs unaccustomed to food in which the process of putrefaction has commenced.

As everyone knows, huskies are fed frozen fish in the arctic regions and work on it; further, farm dogs will feast on a frozen carcass of a horse as long as it lasts. Nevertheless, cold food from the electric refrigerator will often cause vomiting in house dogs. All three—overeating and ingesting food that is either too cold or tainted—will, if persisted in, in time set up a mild gastritis. The remedy is obvious.

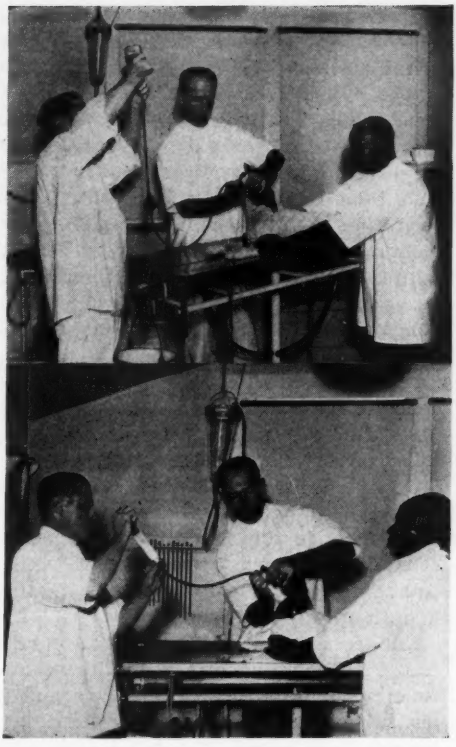
Poisoning of the dog, which is of many kinds, is conveniently discussed under mild gastritis, although it varies from strychnine poisoning, where the gastritis, if it occurs at all, is due to the treatment, to phosphorus and phenol poisoning, where it may be severe but is usually of a mild type. In any case, the stomach is put through quite an ordeal in poisoning, and the after-treatment should be the same as for cases of catarrhal inflammation of the gastric mucosa which will be described later.

Strychnine poisoning is sometimes accidental, more frequently malicious, and always serious, or to be so regarded. Cases that appear mild may suddenly become grave and end fatally. Treatment should be prompt and thorough.

The dog suffering from strychnine poisoning should not be moved. More dogs are lost from taking them to a veterinary hospital to be treated for strychnine poisoning than are saved after they get there. The veterinarian should go with all haste to such cases and administer an antidote; in most instances nembutal. When quieted, and not before, the dog should be taken to the hospital and the stomach emptied by an emetic if this has not been done previously; maintaining all the while the narcosis. Often while in convulsions the animal cannot vomit even when given apomorphine. This is perhaps the only condition in the dog where emesis cannot be induced with ease. After the stomach is emptied the patient should be kept warm and in a quiet place and the narcosis deepened by administering nembutal as required. About every 30 minutes, for one to two hours or even longer, stomach lavage should be employed, using a sodium bicarbonate solution which facilitates cleaning out the mucus.

Phenol and tar poisoning is common from licking it off the surface of the body where it has been deposited by dipping or by other external application and less frequently from absorption through the skin. External absorption can be arrested by a milk bath or laving with rubbing alcohol. Some of that ingested will be removed by inducing vomiting if that has not already occurred and by gastric lavage. Glauber's Salt is a direct antidote, changing the poisonous phenol into a harmless sulphocarbolate, and should be given. For the rest stimulants must be relied upon. Death occurs from arrested respiration, and atropine best supports this function in phenol poisoning.

Nicotine poisoning is sometimes encountered. Owners sometimes dip their dogs in a solution of black leaf 40 to rid them of lice or fleas and poisonous quantities are absorbed. Dogs will sometimes lick up tobacco dust where it is used to treat lice on hens or dusted on the roosts to kill chicken mites. Stimulation must be as prompt as possible. Caffeine is best. The owner may be instructed to give strong coffee while



The use of the stomach tube demonstrated in Horning and McKee's small animal hospital, Houston, Texas.

the veterinarian is getting to the animal. The emergency is almost as great as in strychnine poisoning.

Phosphorus poisoning is common from eating rat poison or roach paste. It is easily recognized by the characteristic odor of the vomitus and by its being luminous in the dark. Emesis, if it hasn't already occurred, stomach lavage, stimulants, quiet and warmth constitute the treatment. The prognosis is usually favorable, if the animal is treated early.

Squill is much used to poison rats. It is supposed to be nonpoisonous to dogs, but cases of squill poisoning occur. The treatment is the same as for phosphorus poisoning. Most cases recover.

When we come to the consideration of definite mild catarrhal inflammation of the gastric mucosa in the dog we find the cases

are not nearly so numerous as was formerly supposed. It may result from a kick in the abdomen, such as is frequently bestowed by meter readers, from rough play, from gulping hot food, from foreign bodies that cause little irritation, from ingestion of chemical irritants, from parasites and from some infectious diseases. And, as has been said, from long-continued gluttony or habitual feeding of food that is too cold or tainted. Foods to which the animals are wholly unaccustomed, such as fowl meat at holiday time, sometimes ferment in the stomach and set up a simple catarrh.

The symptoms are vomiting and a tendency to lie flat on the abdomen in a cool place. In time the animal may lose flesh and the coat may become rough. Coagulated mucus in the vomitus, a capricious appetite and tenderness on pressure are also indicative of gastritis, but by no means constant symptoms. In the case of foreign bodies, x-ray or fluoroscopic examination is ordinarily an aid in diagnosis.

The treatment consists first of all in rest, rest from vomiting and from the normal function of digestion. Ordinarily complete abstinence from food for two or three days should be enforced. Stomach lavage with sodium bicarbonate solution, continued as long as any mucus is removed, should initiate the treatment, and it may be well to repeat it once or twice at 24-hour intervals. After the lavage give an ounce of a mixture of bismuth subnitrate and oil—40gr to the ounce—followed by a teaspoonful of milk of magnesia every hour. When feeding is resumed it should consist of very easily digested food; at first only glucose, later meat juices and soups, then ground raw meat. When the feeding of meat and other solid foods is resumed, the patient should receive also stomachics and digestives such as tincture of nux vomica and pepsin, given in syrup to mask the bitter taste of the nux, or dilute hydrochloric acid and pepsin, which may be given in simple syrup or karo. Tablets containing 4gr of pancreatin, 1gr of diastase and ¼gr of cascara sagrada often prevent the recurrence of vomiting in gastric catarrh and are useful when feeding is resumed.

If supportive measures are needed during the fasting period, glucose may be administered parenterally.

In washing out the contents of the stomach—and this applies also to gastric lavage after strychnine and other poisoning—an ordinary soft rubber horse catheter serves very well. Introduce the sodium bicarbonate solution by gravity through the tube till the stomach is tightly filled and then siphon out. If the liquid does not return readily, pressure on the abdomen will start it. For cats the large size soft rubber human catheter is serviceable for a stomach tube.

The treatment of cases of gastritis due to foreign bodies in the stomach differs only in that the foreign body must be removed first.

The diagnosis of foreign body in the stomach is usually not difficult. Sometimes there is a history that aids or determines the diagnosis. Usually if the animal is fasted 24 hours a foreign body too large to pass the pylorus can be palpated. Many cases can be diagnosed with certainty with the aid of the fluoroscope or x-ray. As with gastritis, vomiting is a symptom.

The extent of the damage done by foreign bodies and hence the prognosis depends much upon their nature. A peach seed, for example, if not removed promptly will do fatal damage to the gastric mucosa by reason of the sharp angles. Smooth objects may be carried in the stomach a considerable time without doing irreparable injury.

Most foreign bodies can be removed without doing a laparotomy and such removal should be attempted unless from the known size or nature of the object there is little or no prospect of success. It is a good plan to fast the animal until all food has left the stomach, then give a quantity of metamusil and after a few minutes permit the animal to fill its stomach with milk, or if it won't drink milk, with any soft, moist food that it likes. Then administer apomorphia. The foreign body will usually come up as the center of a large gelatinous mass. Dry absorbent cotton packed

tightly in capsules and administered half an hour before feeding will often entangle the object and bring it out with the rest of the vomitus. Capsules of kaolin may be used in similar fashion for this purpose. In any case, success is more probable if the animal is first fasted to clear food from the stomach and to induce it to eat readily, even greedily.

Radiograph of the stomach of a Boston terrier. Gastrotomy was necessary in this case; seven toy automobile wheels, nine nails, one pin and a piece of rubber were removed.—Photo by Monroe.

If the foreign body cannot be removed in this way there is still a possibility of its passing the pylorus and traversing the whole length of the intestine safely when coated with metamusil, cotton or kaolin. However, if no other means suffice for its removal, the veterinarian should not hesitate to perform gastrotomy. The operation is not difficult. The use of rubber gloves is imperative for this operation.

Chronic Gastritis

Chronic catarrhal inflammation in the dog results from neglected cases of simple catarrh, from neoplasms and, rarely perhaps, from gastric ulcers. Ulcer of the stomach is, I believe, rare in the dog. I have seen, or at least diagnosed, only one such case in 20 years, and that one was diagnosed on necropsy.

The symptoms are intermittent or periodic attacks of vomiting, a voracious appetite, albeit somewhat capricious. Dehydration, emaciation and inanition develop as the condition progresses. Sometimes coprophagia characterizes it. Usually the organ is dilated and is but slowly emptied after a meal, or perhaps not completely emptied at all. The food is delayed in the stomach and undergoes fermentation, with the formation of butyric acid and other substances not normally produced in the process of digestion. The gastric mucosa becomes coated with a thick, tenacious mucus exudate. It is remarkable what extensive changes may occur in the mucous lining of the stomach in chronic catarrh of that organ. There may be widespread destruction of the secreting glands and even the muscular walls may become partially or almost wholly paralyzed. Chronic gastric catarrh should be differentiated from chronic nephritis carefully. Many of the symptoms are the same.

Complete recovery is not to be expected, but most patients do well if fed carefully and given a dose of pepsin, diastase and pancreatin one-half hour before each meal. They must be protected from hardship, overexercise, and exposure to extremes of temperature or sudden changes in temperature or in the ration.

Demonstration of Rabies Virus Neutralizing Antibodies in Dogs Following Vaccination

By B. M. LYON, L. REDDIN, JR., and VIRGINIA R. WOODMAN,
Pearl River, New York

WE ARE attempting to show in this report that neutralizing antibodies are produced in the serum of dogs which have been treated with the single and multiple doses of canine rabies vaccine, phenol and chloroform inactivated.

TABLE I. NEUTRALIZATION* OF RABIES VIRUS BY SERUM FROM DOGS BLED BEFORE AND AFTER IMMUNIZATION WITH ONE DOSE CANINE RABIES VACCINE

	Date Vaccinated	Dog No.	Date Bled	No. of Mice Injected 8/30/39	Results: Survivals	Rabies	Death from Other Causes
Phenol Killed Vaccine	7/28/39	1	Before Vacc. 7/28/39	6	0	6	0
			After Vacc. 8/29/39	6	1	4	1
	"	4	Before Vacc. 7/28/39				
			Died prior to 2nd bleeding	....	....	....	....
	"	7	Before Vacc. 7/28/39	6	0	6	0
			After Vacc. 8/29/39	6	5	0	1
	"	8	Before Vacc. 7/28/39	6	1	5	0
			After Vacc. 8/29/39	6	6	0	0
Chloroform Killed Vaccine	7/28/39	2	Before Vacc. 7/28/39	6	0	6	0
			After Vacc. 8/29/39	6	5	0	1
	7/31/39	25	Before Vacc. 7/31/39	6	1	5	0
			After Vacc. 8/29/39	6	5	1	0
	7/28/39	5	Before Vacc. 7/28/39				
			Died prior to 2nd bleeding	....	....	....	....
	"	6	Before Vacc. 7/28/39	6	0	6	0
			After Vacc. 8/29/39	6	5	1	0

*0.3cc serum against 0.3cc street virus, dil. 10^{-5}; mixture in chillroom one hour.

Twenty-four dogs of various ages, breeds, and sources, were collected and used in this test. Individual blood samples were taken before vaccination, after which the animals were divided into three groups of eight dogs each. One-half of the eight dogs in each group received phenol-killed vaccine and the remainder chloroform-killed vaccine. Both of the vaccines used had been tested previously for antigenicity according to Webster's mouse protection test, and were shown to have good immunizing value.

Group 1 dogs were given one dose (5cc of undiluted vaccine), Group 2, two doses, and Group 3, three doses, at weekly intervals. One month after the first dose was given, all of the dogs were bled again and these samples, together with the samples taken prior to vaccination, were simultaneously tested for neutralizing antibodies.

Neutralization of the virus was attempted by adding 0.3cc of undiluted serum to an equal amount of 10^{-5} dilution of rabies street virus (skunk) and keeping the mixture at 4°C. for one hour. Six mice were injected with each combination of serum and virus, the dose being 0.03cc, given intracerebrally. The average lethal dose for the strain of virus used was shown to be 10^{-7}.

Results

No dogs in any of the groups showed neutralizing antibodies before vaccination. In four instances, a single mouse out of six survived. This is not considered significant, but rather to be explained on the basis of possible faulty injection technique.

Three dogs receiving one dose of phenol-killed vaccine survived for the bleeding following vaccination, and two of these three produced sera such that no mice died of rabies; two died of other causes. The third dog failed to produce sufficient neutralizing antibodies and four out of the six test mice died of rabies.

Three animals immunized with one dose of chloroform-killed vaccine lived to be bled following vaccination. The serum neutralized the virus to the extent that only two mice out of the 18 injected succumbed to rabies.

Group 2 dogs, receiving two doses of phenol-killed vaccine, reacted as follows:

TABLE II. NEUTRALIZATION* OF RABIES VIRUS BY SERUM FROM DOGS BLED BEFORE AND AFTER IMMUNIZATION WITH TWO DOSES CANINE RABIES VACCINE

	Date Vaccinated	Dog No.	Date Bled	No. of Mice Injected 8/30/39	Results: Survivals	Rabies	Death from Other Causes
Phenol Killed Vaccine	7/28/39	10	Before Vacc. 7/28/39				
	8/ 3/39		Died prior to 2nd bleeding	....	....	....	....
	"	11	Before Vacc. 7/28/39	6	0	6	0
			After Vacc. 8/29/39	6	2	4	0
	"	13	Before Vacc. 7/28/39	6	0	6	0
			After Vacc. 8/29/39	6	5	1	0
	"	15	Before Vacc. 7/28/39	6	1	5	0
			After Vacc. 8/29/39	6	5	0	1
Chloroform Killed Vaccine	7/28/39	9	Before Vacc. 7/28/39	6	0	6	0
			After Vacc. 8/29/39	6	5	0	1
	"	12	Before Vacc. 7/28/39				
			Died prior to 2nd bleeding	....	....	....	....
	"	14	Before Vacc. 7/28/39	6	0	6	0
			After Vacc. 8/29/39	6	6	0	0
	"	16	Before Vacc. 7/28/39				
			Died priod to 2nd bleeding	....	....	....	....

*0.3cc serum against 0.3cc street virus, dil. 10^{-5}; mixture in chillroom one hour.

Three dogs survived to be bled following vaccination, two of which protected 10 mice of 12 injected, one dying of other causes; the third dog's serum protected only one mouse out of six.

Two of the four dogs receiving two doses of chloroform-killed vaccine survived to be bled following vaccination, and their sera protected 11 of the 12 mice injected, none being lost from rabies, one dying of other causes.

In Group 3, two dogs died during immunization with the three doses of phenol-killed vaccine. One of the two remaining protected five of six mice injected, while the serum from the other gave no protection whatever.

All dogs receiving three doses of chloroform-killed vaccine survived. No mice were lost as a result of rabies following the inoculation of the serum-virus mixture; of 24 mice injected, 21 survived and three died of causes other than rabies.

Comments

1. Single and multiple doses of canine rabies vaccine, phenol and chloroform-killed, stimulate production of viricidal antibodies in the serum of dogs. No viricidal action was shown in any of the sera prior to vaccination.

2. No advantage was shown in the antibody production of multiple doses of vaccine as compared with the single, since the single dose alone induced sufficient antibody production to render protection in most instances.

3. It will be noted that a number of dogs were lost during immunization. The losses were due to a severe enteritis which developed soon after these animals were secured from miscellaneous sources, such as city pounds. Many of the surviving dogs were in an extremely emaciated condition, which may account for an occasional poor neutralization.

TABLE III. NEUTRALIZATION OF RABIES VIRUS BY SERUM FROM DOGS BLED BEFORE AND AFTER IMMUNIZATION WITH THREE DOSES CANINE RABIES VACCINE

	Date Vaccinated	Dog No.	Date Bled	No. of Mice Injected 8/30/39	Results: Survivals	Rabies	Death from Other Causes
Phenol Killed Vaccine	7/28/39	18	Before Vacc. 7/28/39	6	0	6	0
	8/ 3/39		After Vacc. 8/29/39	6	5	1	0
	8/10/39	20	Before Vacc. 7/28/39				
			Died prior to 2nd bleeding	....	....	....	....
	"	21	Before Vacc. 7/28/39	6	0	6	0
			After Vacc. 8/29/39	6	0	6	0
	"	22	Before Vacc. 7/28/39				
			Died priod to 2nd bleeding	....	....	....	....
Chloroform Killed Vaccine	7/28/39	17	Before Vacc. 7/28/39	6	0	6	0
	8/ 3/39		After Vacc. 8/29/39	6	4	0	2
	8/10/39	19	Before Vacc. 7/28/39	6	0	6	0
			After Vacc. 8/29/39	6	5	0	1
	"	23	Before Vacc. 7/28/39	6	0	2	4
			After Vacc. 8/29/39	6	6	0	0
	"	24	Before Vacc. 7/28/39	6	1	5	0
			After Vacc. 8/29/39	6	6	0	0

*0.3cc serum against 0.3cc street virus, dil. 10^{-5}; mixture in chillroom one hour.

Useful Prescriptions

No. 1. For Ketosis (Acetonemia) in Cows

℞ Chloral hydrate.....ʒ VI
Water q. s. .....ad O I
M. et f. sol.
Sig. Give one ounce (one measure full) in a pint of cold water twice a day.

Increase the carbohydrates in the ration by the addition of molasses, corn, etc.

The foregoing treatment is a specific for all types of acetonemia.—*J. T. A.* and *C. S.*

* * * *

No. 2. For Anesthesia in Large Animals

℞ Chloral Hydrate.....ʒ I
Water q. s. .....ad 500cc
M. et f. sol. in a 500cc, clean anti-hog cholera serum bottle.
Prepare one to three such solutions, depending upon the size of the animal and the degree of anesthesia desired.
Sig. For Doctor's use.

This is for intravenous injection. As an aid to restraint for minor operations or for the control of vicious or frightened animals, one bottle is adequate.

For more profound narcosis, inject slowly till the desired degree is reached, or until the animal is nearly anesthetized, then complete with chloroform.

Chloral hydrate given in this manner is of great assistance in restraint and makes a good impression on the owner of the animal by relieving it of unnecessary suffering from the painful operation. But the impression is bad if the animal is killed, so relieve the pain, but be cautious.

For colic, azoturia, or any other condition where it is important to relieve pain, dissolve from one to two ounces of chloral hydrate in a quart of warm water and give as a drench or with stomach tube. The good impression made simply by relief of pain in the animal will surprise one not familiar with it.

For choke in large animals give chloral hydrate intravenously to control the pain incident to attempts to dislodge the obstruction.

Cases of dystocia occur in which it is desirable to forestall the expulsive efforts of the female. Give orally, depending on size of animal, from one to two ounces of chloral hydrate well diluted in warm water. Epidural injections of novocaine for this effect is in most cases preferable.

After replacing a prolapsed vagina, one to two ounces of chloral hydrate given orally to prevent subsequent expulsion is very satisfactory. It should be repeated as necessary. Even if the effect must be maintained for two or three days no harm is done by the narcotic.—*J. T. A.* and *C. S.*

* * * *

No. 3. For Colic in Cattle

℞ Chloral hydrate .....ʒ II
Warm water q. s. .....ad O II
M. et f. drench.
Sig. As directed.

Give the foregoing at a single dose and repeat as often as may be necessary to relieve the pain. Keeping the animal in a state of narcosis relieves the griping and prevents gut-tie and intussusception, common fatal sequels of colic in the cow.

We purchase chloral hydrate in 50- and 100-pound lots wholesale to lower the cost, as it is the most frequently used drug in our practice. We use it most often in ketosis, of which we treat about 600 cases yearly. The treatment of this condition by chloral hydrate has failed in only two cases in 10 years. One of these cases was saved by intravenous injections of glucose, and the other molasses orally in conjunction with the chloral. Only rarely do our small Jersey cows in this section require more than three to four ounces.—*J. T. A.* and *C. S.*

* * * *

No. 4. For Bloat in Cattle

℞ Kerosene .....ʒ IV
Color q. s.
Sig. Mix with a pint of water and give slowly as a drench. Repeat in an hour if necessary.

We have found this to be effective treatment for cases that do not require tapping; or it may be used in conjunction with tapping.

J. T. Alston,
Clayton Stephens.

Tupelo, Miss.

Fowl Typhoid*

By L. D. BUSHNELL, Manhattan, Kansas
Department of Bacteriology
Kansas Agricultural Experiment Station

Introduction

FOWL typhoid is described as a specific infectious disease of the domesticated fowl, but it was not recognized as a specific disorder until the progress in bacteriology had become sufficiently advanced to permit the isolation and identification of the organism causing it. It is probably an ancient disease of fowls but was formerly confused with fowl cholera and fowl plague.

The disease was first described by Klein[1] in Enland in 1889, under the name of infectious enteritis. Smith[2] studied it in Virginia in 1894 and Moore[2] studied it in Maryland in 1895. The latter described it as in infectious leucemia because of the appearance of the blood. Curtis[3] in 1902 described an outbreak of the disease under the name fowl typhoid. Pfeiler and Rehse[4] observed the disease in 1912 and gave it the name Hühner typhus. Other outbreaks have been described from all parts of the world, usually under one of the above names. The organism is reported to be pathogenic for most types of domesticated fowls but less so for water birds. The disease has some of the clinical aspects of fowl cholera but the death losses are usually lower and the progress of the disease through a flock less rapid. Many outbreaks will persist for several months in flocks held under contaminated surroundings.

Etiology

Klein named the organism which he studied *Bacillus gallinarum*. Moore named it *Bacillus sanguinerium*. Hadley[5] studied cultures of both these organisms and found them to be identical. The name used in the last edition of Bergey's Manual[6] is *Shigella gallinarum*. The reclassification as Shigella rather than as Salmonella is due to the fact that it does not produce gas from glucose. The organism is a Gram-negative rod which is easily cultivated on the usual laboratory media. Its resistance is about that of the non-spore bearing bacteria. It is easily destroyed by light, heat and chemical disinfectants, but appears to live in polluted soil and water in the absence of light for long periods of time.

Distribution

Fowl typhoid is widely but not uniformly distributed. The disease has been reported from Australia, Africa, Europe and the Americas. It is interesting that this disease appears to be on the decline in most parts of the middle west in the United States. This phenomenon is parallel to that observed in fowl cholera in the same area.

There is a fairly well defined seasonal variation in Kansas as is indicated by the following table.

SEASONAL INCIDENCE OF FOWL TYPHOID IN KANSAS
(PER CENT)

Jan.	Feb.	March	April	May	June
4.3	4.3	7.2	4.3	6.5	7.9
July	Aug.	Sept.	Oct.	Nov.	Dec.
13.7	15.8	11.5	12.2	9.4	2.9

This seasonal incidence varies somewhat from year to year but generally follows the same trend. In this area it is considerably more prevalent during the late summer. Kaupp and Dearstyne[7] report the disease as being more prevalent in late winter and early spring in North Carolina. Te Hennepe and Van Straaten[8], in Holland, found it most prevalent in late spring and early

*Contribution No. 188, Department of Bacteriology, Kansas Agricultural Experiment Station.

[1] Klein, 1889. *Cent. f. Bakt.* 5:689.
[2] Moore, 1894. Bureau Am. Ind. 12th and 13th Ann. Rpt., U. S. D. A. 1895-6.
[3] Curtis, 1902, Rhode Island Agri. Expt. Sta. Bul. 87.
[4] Pfeiler and Rehse, 1913. *Mitt. Inst. f. Landw. Bomberg.*, Bd. 5:306.
[5] Hadley, P., 1918. Rhode Island Agri. Exp. Sta. Bul. 174.
[6] Bergey, 1939. "Determinative Bacteriology," 5th Ed. Williams and Wilkins Co.
[7] Kaupp and Dearstyne, 1924. *J. Agri. Res.* 28:75 and 1925. N. C. Agri. Exp. Sta. Tech. Bul. 27.
[8] TeHennepe and Van Straaten, 1921. Rpt. First World's Poultry Congress.

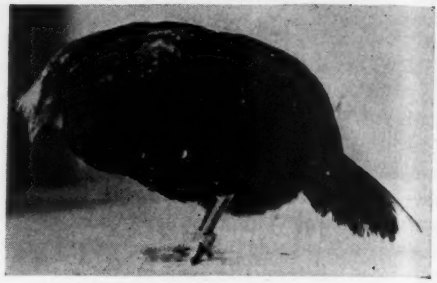
summer. Truche[9], in France, reports the disease the year round in an intermittent fashion but more particularly in the summer. The reason for this variation is not apparent. It has been suggested that it is a question of age susceptibility but the disease has been reported from birds of all ages. The infection may be transmitted to chicks through the egg and has been isolated from the ovary of the hen.

Many types of birds may be infected. Hinshaw[10] reported that the disease caused greater losses among California turkeys than blackhead. Johnson and Anderson[11] reported an outbreak in a flock of guinea fowls in which the mortality was about 30%. Beach and Davis[12] reported this disease as causing a highly fatal disease of chicks. They also reported an ovarian infection in the hen which could be separated from pullorum infection only by cultural studies. Hinshaw and Taylor[13] reported an ovarian infection of a turkey hen from which they isolated the organism. Beaudette[14] isolated the organism from the heart blood and unabsorbed yolk of baby chicks and interpreted these findings to indicate the transmission of the organism to the chick through the egg.

Sources and Modes of Infection

The intestinal discharges of a diseased bird contain the organism in large numbers and hence the droppings are the primary vehicle by which the organisms are spread. Since it is well known that certain birds may become carriers of the infection and remain reservoirs of the organism over long periods of time, it is easy to see why this disease may persist in certain flocks. No doubt the means of dissemination from flock to flock is through contaminated soil. surface washings, and by conveyors of the infection such as man and other animals.

The factors of virulence of the organism and susceptibility of the host must be considered in the spread of any infectious disease. The virulence of this organism under laboratory conditions is variable and when once reduced cannot be regained. There



Fowl Typhoid

appear to be certain unrecognized factors which regulate the gain or loss of virulence under natural conditions. Many flocks of birds have a high degree of susceptibility and the death losses in such flocks are high. In other flocks one or two birds succumb while others escape the infection.

Bushnell and Patton[15] reported an approximate loss of 30%; Kaupp and Dearstyne[7], 26%; d'Herelle[16], 40 to 70%; Lambert and Knox[17], 47.7% in birds fed on 3 to 6cc of a 20-hour broth culture of the organism. Moore[2] stated in his original report that the organisms isolated from the different fowls seemed to be too low in infectiveness to account for the rapid spread of the disease. He did not encounter the disease in flocks kept under satisfactory sanitary conditions and concluded that it was a filth-borne disease, dependent as much upon unfavorable environment as upon the specific organism.

The characteristics of the disease are as follows:

Ante Mortem. — Comb usually pale, or slightly congested in rapid death. Diarrhea present. Droppings usually bile-stained and greenish. Death rate usually slow. Birds appear sick for several days. Prostration not marked. Birds droopy, listless, lack appetite.

Post Mortem.—Serous and fibrinous exudate in pericardium and body cavity. Small whitish necrotic areas on heart muscle. No change in some cases of rapid death. En-

[9] Truche, 1923. *Ann. Inst. Past.* 37:478.
[10] Hinshaw, 1930. *Vet. Med.* 25:514.
[11] Johnson and Anderson, 1933. *J. A. V. M. A.* 85:258.
[12] Beach and Davis, 1927. *Hilgardia*, 2:411.
[13] Hinshaw and Taylor, 1933. *J. A. V. M. A.*, 82:922.
[14] Beaudette, 1925. *J. A. V. M. A.*, 67:741.
[15] Bushnell and Patton, 1924. *Poultry Science*, 4:64.
[16] d'Herelle, 1922. "The Bacteriophage." Williams and Wilkins Co.
[17] Lambert and Knox, 1928. *J. A. V. M. A.*, 73:480.

larged, bronze, or mahogany-colored, icteric liver. Some show small whitish necrotic areas or areas of congestion. Lungs usually normal or of a grayish appearance. Kidneys, small areas of focal necrosis. Spleen greatly enlarged and congested. Leucemia common. Intestine usually shows hemorrhagic and extreme catarrhal inflammation throughout, usually bile-stained contents.

Bacteriological.—Bacteria in blood stream at death. Gram-negative rods. No polar staining, non-motile. Mostly uniform in size, 0.5-0.6 by 1.0-2.5 microns. Some young cultures show long, regular filaments. Grows in luxuriant, grayish-brown, somewhat opaque colonies with wavy borders. In broth, uniform clouding with ring and granular sediment; supernatant fluid does not clear. Indol negative or slight. Nitrates not reduced. H_2S usually produced. Produces acid in glucose and maltose.

Serological. — Organisms agglutinated by homologous serum in high dilutions. Organisms agglutinated by *S. pullorum* antiserum in high dilutions. *S. sanguinarium* antiserum agglutinates *S. pullorum* antigen.

Immunological.—Organisms phagocyted to considerable extent. Rabbits and birds may be immunized by use of killed cultures and to culture filtrates. This organism may be considered as fairly antigenic.

The relation between the organism of fowl typhoid and the organism of pullorum disease is a point of special interest. This relationship should be kept in mind during a pullorum testing program. The antigenic properties of these two organisms appear to be identical. The agglutination relationships of the two organisms were first established by Smith and Ten Broeck[18] and later confirmed by Rettger and Koser[19] and many others. This group relationship has a practical significance in testing for pullorum disease by means of the agglutination test. Runnels and Thorp[20] studied the effect of vaccination for fowl typhoid on the pullorum test, and found that the agglutinins which resulted from the use of the fowl typhoid vaccination were transitory. A minimum period of nine days and a maximum period of 36 days elapsed before the serum titers of fowls inoculated once with fowl typhoid bacterin returned to normal. A minimum of 23 and a maximum of 65 days elapsed for birds inoculated twice. At present it is a common practice to allow 60 days to elapse between vaccination and testing.

[18] Smith, Th. and Ten Broeck, 1915. *Jour. Med. Res.* 31:503.
[19] Rettger and Koser, 1917. *Jour. Med. Res.* 35:443.
[20] Runnels and Thorp, 1927. *J. A. V. M. A.*, 72:90.

Control

The most effective method of controlling this disease is to prevent the spread of the infectious material from a carrier to a healthy bird. This is difficult in the average poultry flock since the bird normally deposits the infection in the soil and water with its intestinal excreta and takes its food and water from the same sources.

Methods of control may be listed under five headings: (1) Isolation, (2) Sanitation, (3) Medication, (4) Vaccination, (5) Detection and removal of carriers. The methods to follow for the first and second are well known. For medication the use of Epsom salt at the rate of one pound per 100 adult birds at intervals of two weeks appears to be of considerable value. Vaccination for this disease is of much greater value than in case of fowl cholera. These organisms have a fairly high degree of antigenicity and specificity which is not the case with *P. avicida*. The best results obtained at this laboratory are by the use of autogenous bacterins. The organisms should be isolated directly into broth and not grown on solid media. They may be killed by means of heat or chemicals. Two treatments are more effective than one, and three more effective than two.

The agglutination test may be used to remove carriers. When this is followed by a careful sanitary program the disease may be controlled without much difficulty. The removal of all healthy birds to new runs is of great importance in controlling any infection. The drinking vessels should receive special attention and birds must not be allowed to drink from stagnant pools and streams during an outbreak. Any new stock and all birds returned from shows should be quarantined for at least two weeks before they are returned to the flock. A combination of all the above methods will give excellent results.

Avian Surgery

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THE subject of bird surgery has received little consideration in the past, as is evidenced by the scarcity of literature on the subject. What has been done in the main can be credited to poultry men, geneticists, endocrinologists and others with no surgical foundation. Perhaps the low value of the individual farm fowl has prevented the veterinary profession from developing this field. Under conditions of mass corrections in some flock disturbance, or high individual value of show birds or rare ornamental fowl, our utmost professional skill would bring monetary compensation. As an accommodation, a little avian surgery will bring one many friends and much satisfaction. Setting a broken leg bone on a pet parrot or a broken wing on a stray songbird gives one a feeling of worthiness and in appropriate circumstances a commensurate fee. Caponizing a dozen cockerels for a farmer's wife cements one's business relations with that family.

Avian surgery is a veterinarian's work and if he does not perform it, those less qualified, who do, will tend to extend their activities to other veterinary fields. Quacks in any line seldom enter the field full blown, but intrude by degrees.

Birds make excellent surgical subjects as they have a higher resistance to pus-forming organisms than do mammals. Evidence of this is seen in the successful abdominal operation of caponizing, which is usually done with little or no regard to surgical cleanliness.

Anesthetics are not commonly used in bird surgery except in the experimental field. Ether and chloroform are effective, but due to their getting into the residual air in the air sacs, the factor of safety is not great, and some little experience is needed to recognize the paralytic stage. For the average chicken, the use of one two-hundredth grain of atropine sulphate, given subcutaneously in 1cc of saline solution before the inhalation anesthetics, is of value.

Chloral hydrate (0.4gm in 1cc of saline solution) intravenously gives complete anesthesia. Sodium pentobarbital (0.3gr per pound) given intravenously in the wing vein is the most satisfactory general anesthetic, according to Warren and Scott. Durant and McDougle use 1.1gr of sodium pentobarbital for each five pounds of live weight in turkeys.

Local anesthetics can be used if desirable but their use is limited under most circumstances.

Surgery of birds is readily divided into two fields, practical and experimental. The latter group, not described here, includes the operations of abligation of the ceca in turkeys, removal of the gizzard, removal or insertions of sections of the oviduct, operative removal of the yolk sac of newly-hatched chicks (deutectomy), and many other surgical procedures used to study experimental effects in some research problem.

The first group, listed as practical, might better be labeled necessary surgery. It is the group we shall consider, and it may include the barnyard fowl, game birds, ornamental fowl, or, as in my own experience, amputating the necrotic leg of a golden eagle or removing the eye of a canary.

Many of the conditions we meet with in general animal surgery confront us in dealing with birds. The removal of tumors, draining of cysts, recognition of malformations, etc., require the same treatment that small animals would be given, and these operations therefore need no special de-

Avian surgery is well worthwhile. More veterinary attention is needed to improve the technique and economic usefulness of this neglected field of service.

scription. The following avian operations, however, require special descriptive explanation.

Fractures

In bird practice, broken bones, especially the long bones of the legs and wings, commonly confront the veterinarian. If they are simple fractures they heal readily in ten days if the broken ends are properly immobilized. The use of yucca wood, basswood paddles, or for canaries, even cork, goose quills, or match sticks held in place with gauze bandage coated with sodium silicate, is highly satisfactory. The major consideration should be lightness and firmness. If the fracture is badly compounded, a window in the splint and the application of a powder antiseptic, such as iodoform and boric acid, one to ten, should be applied. A high calcium diet and rest and quiet are conducive to more rapid convalescence.

Abscessation

Abscess of the foot, also called bumblefoot, is a common condition met with in poultry. The most frequent causes are bruises of the soles due to jumping from high perches to concrete or rough, hard floors, thorns or other prick wounds, square perches, cuts from glass, tin cans, barbed wire, and nails. The ball of the affected foot becomes swollen and sensitive. Avian pus usually is present; this is usually of a cheesy consistency, and must be scraped out manually as it does not drain of its own accord. Painting the cavity with tincture of iodine gives satisfactory results. Bandaging the foot or protecting it with a leather pad aids the recovery.

Claw Trimming

Trimming the spurs of male breeding turkeys protects the hens from many back wounds. Among cocks that are likely to fight the same operation is useful. Everything from a hacksaw blade to a pair of tinsnips has been used for this purpose, but a pair of good canine bone shears allows removal of the offending spurs with almost no hemorrhage. While removing the spur it is advisable to trim any sharp toenails down almost to the quick on breeding turkeys. A little powdered tannic acid or other styptic will control the hemorrhage should one cut the claw too short. Canaries, parrots, and other caged birds need to have their toenails watched and excessive growth corrected.

Debeaking

To control cannibalism and to prevent male birds from fighting, debeaking is often indicated. This procedure[1] can be applied to any chicken over four weeks of age, with comparatively little discomfort to the bird and practically no loss of blood. It does not prevent the bird from eating, nor does it seem to affect egg production more than handling the birds for some other reason.

Only the upper beak is removed. A small cut, about 1/16 to 1/8 inch long, is made in the edge of the beak 1/8 to 1/4 inch back of the tip; the flat side of the knife blade is then lifted against the anterior portion of the beak, which is easily torn loose and removed. (The initial cut is made only to get a hold to begin the tearing.) After the beak is torn over to the other edge, it should be pulled toward the lower beak to remove the edge. This gives the removed tip a V shape, which prevents the bird from grasping feathers or flesh and renders it harmless for two or three weeks, until the beak grows back again. By that time most birds will have forgotten their previous vices. Should they become troublesome later, they may be debeaked again.

Crop Impaction

Occasionally a condition of impaction of the crop, or "crop bound" is met with. This is usually due to ingestion of some foreign material; less frequently, to other forms of obstruction. Often inserting a glass tube down the gullet, inverting the bird, and injecting water will loosen the mass. If not, simple cutting through the skin, avoiding the larger blood vessels, cleaning out the material and suturing the incision should be resorted to. Soft feed should be fed for a few days. In the case of enlarged, pendulous crops it is sometimes desirable to remove an elliptical section of the crop wall before suturing.

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[1] Kennard, D. C., 1937. Chicken vices. *Bimonthly Bul.*, 22:184, Ohio Agric. Exp. Sta.

Abstracts

Transmission of Fowl Paralysis

It having been shown that 50% of the chicks hatched from visibly affected birds showing the eye form of fowl paralysis developed the disease in from 57 to 171 days and that 60% of chicks from affected birds developed some form of paralysis in the third generation within from 171 to 337 days, the authors[26] were led to test the infectivity of the blood of chicks hatched from eggs of hens affected with visible clinical symptoms of the disease. The blood from 22 of 42 chicks from eggs hatched from fowls showing visible clinical symptoms of the disease was inoculated into 527 healthy day-old chicks. With the exception of two periods the inoculations were made at 10-day periods until 28 inoculations falling into fourteen 10-day periods were completed and the donors had reached the age of 136 days. Controls to the number of 507 chicks were maintained. The blood was transfused immediately without any treatment. A total of 91 birds developed fowl paralysis in the inoculated group, whereas only 18 developed the disease in the control birds. The results also show that there were three periods of age of the donors at which the blood more readily transmitted the disease to the recipients, (1) 20 to 30 days, (2) 50 to 60 days, and (3) 110 to 120 days. These studies indicate that fowl paralysis produced artificially by intravenous inoculation occurred somewhat earlier than natural transmission, 25 cases occurring over a period of four months in the inoculated birds before any case appeared in the control birds. The data also show that the eye form (both inoculated and control) of fowl paralysis develops much later than other forms. There were no blood changes involved in the fowl paralysis cases. The data also show that leucosis and tumor formations were not involved to any extent in these investigations.

[26] Durant, A. J. and H. C. McDougle, 1939. Studies on the origin and transmission of fowl paralysis (neurolymphomatosis) by blood inoculation. *Mo. Sta. Res. Bul.* 304, p. 23. Abst. in *Exp. Sta. Rec.* 82:2, pp. 258-9.

Turkey Raising

The turkey industry in Missouri[29] is a source of more than $750,000 farm income annually. The control of blackhead is the most serious problem in the rearing of turkeys; 90% of those that die of disease succumb to blackhead. The market preference in turkeys is changing, 73% of the demand now being for birds weighing (dressed) 13 pounds or less; only 5% of purchasers want a bird weighing more than 18 pounds.

Prevention and control of blackhead depend upon the essential practice of brooding on clean range or in confinement followed later by rotated, clean range provisions. This tends to avoid worm infestations, particularly the cecal worm. Adult birds should be kept well separated from the chicken flock.

An added precautionary measure used by some growers involves the use of a fresh tobacco dust treatment repeated every four to six weeks during the growing period. Three pounds of fresh tobacco dust are added to 100 pounds of the growing mash for a two-week period. Immediately following the treatment the turkey flock should be moved to clean range to avoid reinfestation with worms.

In the event an outbreak of the disease occurs the use of the turpentine treatment described in the following paragraphs will materially aid in reducing losses and in securing the recovery of some of the affected birds.

The first step in the use of this treatment involves isolation of all visibly affected birds. The entire flock should be handled carefully to detect any birds showing the slightest symptoms of being listless or out of condition. These birds should be confined in clean, sanitary quarters and a litter of at least six to eight inches in depth placed on the floor.

The apparently healthy birds should be given an individual treatment consisting of a No. 00 gelatine capsule filled with turpentine for birds weighing less than eight pounds and a No. 000 capsule for larger

[29] Rohde, C. E., and D. D. Moyer, 1938. Turkey production in Missouri. Univ. of Mo. Agr. Ext. Serv. Circ. No. 382.

birds. The day following the treatment the birds should be moved to a clean range.

The quarantined birds may be given the same treatment. Milk and moist mash should be provided. Copper sulphate should be used in the drinking water at the rate of one ounce of bluestone crystals to eight gallons of water. Following the treatment the birds that recover should continue to be confined away from the unaffected birds.

Pullorum disease, slipped tendons, coccidiosis, chicken pox, roup and colds, cropbound and pendulous crop, and lice are also discussed in the bulletin.

Rabies in Hungary

A comparison of data[30] supplied by the Pasteur Institute and Hospital of Budapest and the Hungarian National Institute of Animal Health shows that while the compulsory preventive inoculation of dogs against rabies has led to an almost complete disappearance of the disease in dogs in the inoculation areas, the number of persons treated for bites has not suffered a corresponding decrease; the number of persons bitten by dogs remained practically the same, as well as the number of persons bitten by other animals. The need for the protective inoculation of bitten human beings persists despite the almost complete disappearance of rabies in dogs as a result of compulsory inoculation.

Identification of Horses by Impressions of the Palate

This work[31] is divided into two sections; in the first is studied the superficial markings of the palate, and in the second these observations are applied to the identification of horses. The authors conclude, after having examined about 300 equine palates, that the palatine ridges in the horse are sufficiently variable for indentification purposes. They classify the indentifiable features in the following order:—origin of the ridges, form of the median tubercle, appearance of the raphe, and the slope and direction of the ridges. These features do not change with the age of the horse. The authors recommend that all descriptions of horses should be accompanied by a photograph or impression of the palate showing the ridges.

Stallions Carriers of Equine Influenza

Two notable outbreaks of equine influenza among mares, which had been bred to imported stallions, are reported.[33] The symptoms were those of typical influenza; no cases terminated fatally. Since the stallions used came from a stock farm where there had been a severe outbreak of influenza previously, it is suggested that the virus was carried in the reproductive organs. An unsuccessful attempt was made to infect an aged mare with semen taken from a suspected stallion six months after the outbreak.

Chemotherapy of Bacterial Diseases

There are important differences between the metabolism of microorganisms and of macro-organisms, which make it possible for certain chemical substances to exert a specific action on the organisms in disease without producing any toxic effects in the host.[34] Both physical and chemical factors play a part in the interaction between the chemotherapeutic substances and the infective agents. One of the difficulties in dealing with bacteria is their high rate of multiplication; bacteria also have great powers of adaptation to the environment. The action of chemotherapeutic substances on protozoa, on bacteria and on viruses (lymphogranuloma inguinale) is a complex one, consisting of several phases in which the host takes an important part.

[30] Bobko, B., 1938. Ebek kötelezõ védõoltasanak eredménye és kihatása a közegészségügyre. *Allatorv. Lapok.* 61, pp. 314-318. Abst. in the *Vet. Bul.* 10:2, p. 93.

[31] Tagand, R., and Tisseur, 1939. L'identification du cheval au moyen des crêtes palatines. *Rev. Med. vet. Toulouse* 91, pp. 185-211. Abst. by N. J. Scorgie in the *Vet. Bul.* 10:2, p. 147.

[33] Schofield, F. W., 1937. A report of two outbreaks of equine influenza due to virus carriers (stallions). Rep. Ont. Vet. Col. 1937, p. 15. Abst. by J. L. Byrne in the *Vet. Bul.* 10:3, p. 173.

[34] Schlossberger, H., 1939. Entwicklung, Wesen und Möglichkeiten der Chemotherapie bakterieller Infektionen. *Zbl. Bakt. I. (Orig.)* 144, pp. 196-206. Abst. by J. M. Robson in the *Vet. Bul.* 10:3, p. 210.

Book Reviews

How to Own a Dog and Like It! *By A. C. Merrick,* D.V.M. Cloth bound. 112 pages; 16 illustrations. Country Life Press, Garden City, N. Y., 1940. 25c and labels from 3 cans of Pard Dog Food. (This offer expires June 15, 1940; thereafter the book will be on sale at book and department stores at standard book prices.)

This is the latest of several recent attempts by veterinarians to write a work for the dog owner, and in the opinion of the reviewer, the most successful of such attempts.

Doctor Merrick (Ohio State University '24) operates a model small animal hospital at Brookfield, Illinois, and is well-known as an outstanding small animal practitioner. Last year he was president of the Chicago Veterinary Society. He brings both scientific knowledge and practical information to this little treatise. L. A. Merillat, Executive Secretary of the A. V. M. A., states in a foreword that it is "a fascinating book full of well-told facts and opinions and free of surplus words." The attractive makeup, clear, legible type, and simple style make it easy reading for both adults and children. It is a book which can be recommended without reservations to dog owners, present or potential.

The subjects covered include: selecting a dog, training, care, feeding, minor ailments and their prevention, ailments which need veterinary attention, first aid in accidents, breeding, care of the pregnant bitch and the puppies.

The illustrations are half-tones of various breeds of dogs, and of scenes in the author's animal hospital.

The Boxer. *By Dan M. Gordon,* M.D. Cloth bound. 159 pages; 118 illustrations (photographs and line drawings). Judy Publishing Company, Chicago, 1940. $2.50.

This is the tenth of the Judy books on dog breeds. The author, Doctor Gordon, is a noted Detroit breeder.

The origin, history and development of the boxer breed, the official standard and its interpretations, show conditioning and handling, are presented interestingly and fully, in a manner similar to that of the other Judy books.

The last 66 pages, written by Captain Judy, review the principles of breeding, feeding, training, showing, selling, etc., applicable to any breed. These contain the same practical information presented in the other books of the series.

This, like previous books, carries the statement that rabies is rare, and no reference is made to the desirability of antirabies vaccination (except as a possible "selling point" in the chapter on sales suggestions). Running fits are still described as a slightly contagious disease of unknown cause, although in deference to recent experimental work the sentence "An injection of vitamin B_1 (supplying protein) usually is beneficial," indicating considerable confusion in the mind of the author, has been added to the paragraph advising rest, fasting, physicking and a meat diet for this condition. A statement that ear trimming is a matter for veterinary attention is followed by a rather complete description of the operation, in sufficient detail to be attempted by anyone. These and some of the directions for the diagnosis and treatment of certain disease conditions are of doubtful value to the dog owner; a little knowledge is still a dangerous thing. However, considerable—perhaps sufficient—emphasis is placed on the advice to call a veterinarian early when a dog is ailing.

On the whole, the book is full of valuable information about the boxer breed and about dogs in general, and can be recommended to owners and breeders.—*M. C. B.*